A Theoretical Framework to Foster Parent-Infant Attachment during NICU Hospitalization through Music Therapy

By

Shelbi LeaAnn Polasik, BME, University of Kansas, 2016

Submitted to the graduate degree program in Music Education and Music Therapy and the Graduate Faculty of the University of Kansas in partial fulfillment of the requirements for the degree of Master of Music Education (Music Therapy).

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Chairperson: Dr. Deanna Hanson-Abromeit

_____

Dr. Cynthia Colwell

_____

Dr. William Matney

Date Defended: May 10, 2018

The Thesis Committee for Shelbi LeaAnn Polasik
certifies that this is the approved version of the following thesis:

A THEORETICAL FRAMEWORK TO FOSTER PARENT-INFANT ATTACHMENT DURING HOSPITALIZATION THROUGH MUSIC THERAPY

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Chairperson: Dr. Deanna Hanson-Abromeit

Date approved: May 10, 2018

Abstract

A premature birth and subsequent admission into the NICU is a uniquely stressful event in a family's life. This hospitalization has effects on the infant's developmental trajectory, the parents' ability to provide cares for their infant, and the formation of secure attachment between the parents and the infant. Due to attachment's impact on future development of the infant, it is necessary to consider the impact of hospitalization on the ability of the family unit to develop a secure attachment. Research discussing attachment and developmental needs of infants and their families is emerging and, currently, no music therapy literature exists that focuses on music intervention involving developmentally sensitive care and promoting secure attachment between parents and infants in the NICU. The purpose of this study was to create an evidence-based theoretical framework for a music intervention that can promote attachment between parents and an infant in the NICU. A review of literature and combination of the formal theories including transtheoretical model of behavior change, synactive theory of development, hierarchy of needs, and pediatric psychosocial preventative health model inform a moderated causal model that identifies important components of the attachment process between parents and infants in the NICU. A theoretical framework to foster parent-infant attachment during NICU hospitalization through music therapy is illustrated. Implications for clinical practice and future research are also discussed.

Acknowledgments

Gratitude is a pitiful word for what I need to express to the following people. Deuteronomy 33:25 says that "your strength will equal your days" and my strength was found in each of you along this journey. I am indebted to each and every one of you.

Dr. Hanson-Abromeit, you challenged me, supported me, and altered my worldview with your enthusiasm to seek out knowledge. There are not enough thanks or cinnamon rolls in the world to show my gratitude. My committee members, Dr. Colwell and Dr. Matney, you provided insight into this process that shaped and clarified my thinking. Your kindness and graciousness are deeply appreciated. To learn from each one of you was a great privilege and I hope to carry your wisdom with me always.

To the School of Music faculty and staff at the University of Kansas, you have been an integral part of my academic career. You fostered growth in me that I did not know was possible. Thank you for pushing me into new territory and coming along for the ride.

Thanks and love to my family for their unyielding support of me in all things academic and beyond. Mom, Dad, and Kaitlin, you continue to show love, compassion, and mercy to me on a daily basis. I hope to mirror that to you all. Grandma, you listened to me with enthusiasm and sparkle in your eyes each time you asked how school was going. I am so grateful for you. Aunts, uncles, and cousins, you make life brighter and richer. Thank you for holding me close in your hearts and arms. I love you all.

Dave, you are one of my most favorite humans ever created. I cannot wait to explore the coming years with you. Thank you for your patience and love. Your support means more than I can say and I hope to provide that same support to you. Life is infinitely rose-colored with you.

To the families I work with every day, thank you for allowing me into your lives. Each of you is precious to me and I am grateful beyond measure for the opportunity to know and learn from you.

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Chapter 1

Introduction

Hospitalization of a newborn infant can be considered a crisis situation for the family unit. The hospital environment in neonatal intensive care units includes medical procedures, noxious stimuli in neonatal intensive care units (e.g. lighting, noise levels), and a separation of family members from the infant due to medical procedures. These factors result in the parents' loss of opportunity to provide care; therefore, interrupting parents' ability to physically bonding with their infant, form early connections, and promote attachment (Martinez-Torteya, Rosenblum, & Marcus, 2017; O' Gorman, 2007; Shoemark & Dearn, 2008). Both the act of touch and response to the infant's signals for comfort and care form cornerstones for developing a secure attachment (Duft, Stafford, & Zeanah, 2017). Upon transition from the NICU to home, parents report feelings of uncertainty and fear due to medical fragility of the infant (Garfield, Lee, & Kim, 2014). These feelings and emotions can lead to decreased interactions with the infant, which may negatively impact attachment between the infant and caregivers.

Attachment is defined as a behavioral system that naturally motivates an infant to seek meaningful interactions with their caregivers. Infant-caregiver dyads learn how to signal and respond to needs, which assists the infant in developing emotion regulation skills. As the infant grow, it utilizes caregivers as a secure point from which to explore the world around it, based on the attachment with the caregiver. This attachment influences other behavioral systems, including exploratory, fear/wariness, and sociable/affiliative (Duft, Stafford, & Zeanah, 2017).

An infant's exploratory system motivates a temporary deactivation of the attachment to the caregiver in order for the infant to explore their immediate environment. At this time, the infant feels comfortable with both their developing motor skills and the caregiver's availability

towards their needs. The fear/wariness system coordinates the infant's response to strangers or new situations by activating the attachment system towards the caregiver, who in turn responds to the needs of the infant in the unfamiliar situation. Sociable/affiliative systems motivate the infant to socially engage with others in their environment, translating skills learned during interactions with caregivers to the novel social situation. Each of these systems potentiates or inhibits the others, making attachment an integral and crucial aspect of infant development (Duft, Stafford, & Zeanah, 2017).

Attachment occurs when an infant's most basic physical and emotional needs are met. At birth, an infant possesses limited ability to discriminate between caregivers; however, this quickly changes, making the need for consistent and present caregivers more apparent (Duft, Stafford, & Zeanah, 2017). By the second and third months of life, the infant demonstrates different behavioral interactions with primary caregivers as opposed to others, along with increased social communication with their caregivers (Duft, Stafford, & Zeanah, 2017; Rosenblum, Dayton, & Muzik, 2009; Shoemark, 2013). During the seventh through ninth months, the infant forms a preferred attachment to a primary caregiver, typically the mother, using physical proximity and social signals to indicate desire for this individual (Duft, Stafford, & Zeanah, 2017; Rosenblum, Dayton, & Muzik, 2009). These attachment behaviors are all indicative of a secure attachment classification between the infant and their caregiver.

Classifications for attachment focus on the type of attachment in the caregiver-infant dyad. There are four types of attachment classifications including secure, insecure-avoidant, insecure-resistant, and disorganized attachment. An infant with disorganized attachment is usually found in high-risk environments where their caregivers are threatening, frightening, or dissociated, disconnected and separated from the caregiver. In this instance, the caregiver is not

only the solution but also the source of the attachment alarm (Duft, Stafford, & Zeanah, 2017). This type of attachment can occur in the NICU due to the nature and complexity of the medical environment for a newborn and the unique type of stress it places on the parents. When both parent and infant experience stress at increased levels for prolonged periods of time, there is a greater risk for insecure attachment classification (Goodman & Brand, 2009; Haslbeck, 2012; Moody, Callahan, Aldrich, Gance-Cleveland, & Sables-Baus, 2017; Nix & Ansermet, 2009; Shoemark, Hanson-Abromeit, & Stewart, 2015; Standley & Walworth, 2010).

Non-secure attachments not only inhibit emotional development, but also neurobiological development. Alterations in brain structure and function due to early experiences of deprivation and consistent stress are evident especially after six months (Duft, Stafford, & Zeanah, 2017; Shoemark, 2013; Standley & Swedberg, 2011; Standley & Walworth, 2010). These abnormalities include decreased grey and white matter volumes, decreased electrical activity in higher frequency brain waves, increased electrical activity in lower frequency brain waves, delayed brain maturation, decreased amygdala volume, connectivity interruptions between the amygdala and pre-frontal cortex, hemorrhage of the periventricular leukomalacia, and chronic hypothalamic-pituitary-adrenal (HPA) axis activation which elicits a continual fear response (Als & McAnulty, 2011; Duft, Stafford, & Zeanah, 2017; Rifkin-Graboi, Borelli, & Enlow, 2009; Sheridan & Nelson, 2009).

When the developing infant brain is extensively stunted, emotional regulation, executive functioning, memory, attention, and planning are all negatively affected. Potential comorbidities for this type of brain alteration include developmental delay, autism spectrum disorder, post-traumatic stress disorder, conduct disorder, and attention deficit hyperactivity disorder/attention deficit disorder along with a variety of medical complications (Duft, Stafford, & Zeanah, 2017;

Shoemark, 2013; Standley & Walworth, 2010; Zeanah & Smyke, 2009). These comorbidities also negatively influence the infant's development, including attachment between the infant and primary caregivers, who are typically parents.

Due to the long-term effects of improper attachment in the early years, preventive intervention is critical to ensure appropriate development for infant-caregiver dyads where typical attachment opportunities are interrupted such as extended hospitalization. Resiliency to traumatic events, such as extended hospitalization, typically occurs in family units with low conflict and infants/children who can consistently regulate their emotions (Y. Jackson, personal communication, 2017). Preventive intervention for attachment between an infant and their caregivers provides the family unit with social supports that are a protective resource to increase skill sets and decrease exposure to stressors, while exposing the family to more experiences and opportunities. These interventions should also provide the infant with the chance to bond with their emotionally available attachment figures.

Healthy attachments are composed of sensitive caregiving that demonstrates the caregiver's complete psychological investment in the infant (Dellenmark-Blom & Wigert, 2014; Duft, Stafford, & Zeanah, 2017). Caregivers of children at risk for insecure attachments cited barriers to the process, including disordered sleep and feeding patterns of the infant, and parental aggression towards the child due to fear and lack of knowledge on proper care techniques (Duft, Stafford, & Zeanah, 2017). These barriers are common in the NICU, along with stress and anxiety, due to the environment and fragile nature of the infant (Nix & Ansermet, 2009; Rosenblum, Dayton, & Muzik, 2009; Smith, Hwang, Dukhovny, Young, & Pursley, 2013).

An infant's stay in the NICU is an atypical experience for primary caregivers; it affects the ability of the family to bond cohesively and develop attachments to one another. Caregivers

often express concern over navigating relationships with a medically fragile infant after leaving the hospital (Caine, 2016). Primary caregivers cite pervasive uncertainty about myriad aspects of caring for their infant after extended hospitalization. These aspects include the perception of their child, presumed capabilities of the outpatient health care team, their own abilities to care for their child, finding balance between work and family, general stress that affects mental and physical well-being and the general knowledge gap of new parents (Garfield, Lee, & Kim, 2014).

Once a discharge date is set, a time of transition begins for the family. Transition Theory, conceptualized by Meleis and Trangenstein in 1994, defines transition as a passage or movement from one state, condition, or place to another. This creates a vulnerable time frame because of health status, role relation, expectation, and changes in ability levels. Leaving the hospital and the caregivers feelings of readiness for discharge is a multidimensional concept that involves perception of skills and actual abilities to manage their infant's care in the home environment (as cited in Chen, Zhang, & Bai, 2016).

Understanding the parents' experiences during their infant's transition from the NICU to home environment is essential for improved infant health outcomes (Broedsgaard & Wagner, 2005; Chick & Meleis, 1986). Time is a major element of transition, which spans from the anticipation of the new reality (discharge date set) to the established perception of new aspects of life (discharged to home from the NICU). During transition, the individuals involved are in the middle of "restructuring a new reality" that is described in four different care phases: premature parental onset, parental incompleteness, parental involvement, and parental completion (Hutchinson, Spillett, & Cronin, 2012, p.3). When a secure attachment is not formed by the phase of parental completion, developmental outcomes are put at risk.

Music Used to Promote Attachment

For parents experiencing stress and overwhelming emotions with an infant in the NICU, music therapy can be utilized to promote attachment within the infant-caregiver dyad. Healthy relationships between caregivers and their infant place focus on emotional access to the infant, which then leads to internal regulatory function development. These relationships offer consistent and intimate availability through interactions that meet the infant's needs (Edwards, 2011). Interactions focusing on attachment with the infant promote development of self-regulation, the ability to organize sensory information so overstimulation does not occur, and social-emotional competence, combining elements of interactions (prosody, facial affect, tone, etc.) to provide meaning to the information, due to the infant's innate desire to form relationships with their caregivers through face-to-face interaction (Caine, 2016; de l'Etoile, 2015, Martinez-Torteya, Rosenblum, & Marcus, 2017).

Parents anticipating discharge to home both request and greatly appreciate comprehensive interventions that promote and facilitate their caring for their own infant (Sisson et al., 2015, as cited in Caine, 2016). Effective attachment interventions are shown to combine psychoeducation on infant's attachment needs, identify cognitive and affective barriers towards proper caregiving, optimize parenting behaviors to encourage secure attachments, and promote opportunities to implement those behaviors when caring for the infant (Martinez-Torteya, Rosenblum, & Marcus, 2017). When participating in attachment and bonding music therapy interventions, parents report increased awareness of the infant's signals for care, increased awareness regarding how to appropriately respond to those signals, a stronger belief in their ability to care for the child, and increased knowledge regarding how music can be utilized to

increase parent-child interactions and encourage development across all domains (Abad & Edwards, 2004; Chen, Zhang, & Bai, 2016; Haslbeck, 2013).

An infant who receives attachment and bonding interventions with their primary caregivers experience extensive benefits, including the following: shorter mechanical ventilation periods and lower rates of chronic lung disease; decreased length of hospital stay; increased weight, length, and head circumference; quicker neurosensory maturation; better automatic, motor, state, attention, and self-regulatory functions; and higher infant developmental scores (Als et al., 2003, Melnyk et al., 2001, 2006; Olischar, Shoemark, Holton, Weninger, & Hunt, 2011; Symington & Pinelli, 2006). Music therapy interventions are also shown to benefit premature infants in these same ways, as well as promoting bonding and attachment between family members, enhancing developmental stimulation, decreasing stress in both infant and caregivers, providing counseling and education on infant care, and assisting with transfer to the home environment (Standley, 2002).

Appropriately-administered music stimulation in the NICU assists with maintaining homeostasis and increasing infant growth rates and can also provide an opportunity to develop sustained attention towards music and the care provider, thus promoting attachment (de l'Etoile, 2006). An infant in the NICU is not exposed to the same nurturing timbre and acoustical environment of the womb, which they attune to as early as 16 weeks gestational age (Loewy, Stewart, Dassler, Telsy, & Homel, 2013). Music is seen as a positive auditory stimulus that is organized and purposeful as opposed to the more sporadic and random sounds of the NICU (Hanson-Abromeit, 2003; Loewy et al., 2013).

An infant's neurologic functions also prime it to respond positively to music stimulation. An auditorily and neurologically mature infant can discriminate pitch and develop recognition

and emotional attachments to specific vocal timbres. The infant is also skilled in processing timing cues and metrical structures that are found in music. Vocalizations, when coupled with cares, promote intimacy between parents and the infant, thus encouraging attachment (Delavenne, Gratier, & Devouche, 2013; Edwards, 2011).

Education and Teaching for Parents in the NICU

Interventions involving parent coaching prior to leaving the NICU are part of a recent shift in healthcare that focuses on attachment, trauma, and neurologic treatment models (Shoemark, Hanson-Abromeit, & Stewart, 2015). When an infant is hospitalized for extended periods of time, parents are unable to provide standard care for the infant due to its medically fragile condition. This fracture in the caregiving process can create a lack of autonomy in the caregiver-infant relationship. Through interventions focusing on attachment, caregivers are able to develop a sense of autonomy and confidence in caring for the infant. Autonomy emerges as a result of critical thinking and competence abilities (Franklin-Hall, 2013). The ability to critically think and reason strengthens the locus of control, which when directed internally and reinforced, better equips people to maneuver significant life changes (Silverman, 2010).

Since the locus of control is an essential aspect of autonomy, which assists in competence and confidence caring for a critically ill infant, a therapist supported music intervention may be an ideal treatment option for caregivers transitioning from the NICU to home environment. Active music making experiences have become uncommon in society, with parents viewing themselves as music consumers, who are not capable of providing musical experiences for their infant in the home (Levinowitz, 1999, as cited in Walworth, 2009). Music therapy services allow for parents to use their complementary expertise while actively participating in their infant's care, creating a triadic relationship between the music therapist, infant and family that

provides a positive bonding experience (Shoemark & Dearn, 2008; Thompson, 2012). When learning to parent, feedback during caregiver-infant interactions is critical to the process (O'Gorman, 2005). Music therapists can facilitate infant-directed singing and other tasks that focus on interpreting and responding to the infant's signals providing parents the tools and resources to engage musically with their infant. When caregivers lead such tasks, the interaction promotes bonding, attachment, and learning within the infant-caregiver dyad (Standley, Walworth, Engel, & Hillmer, 2011).

Purpose of the Study

The purpose of this study was to create an evidence-based theoretical framework for a music intervention to promote attachment between parents and an infant in the NICU. Relevant formal theories and research literature were explored, and a theoretical framework was developed from the findings. The future directions for intervention development were discussed as well as the impact of the findings on clinical practice and research.

Chapter 2

Review of Literature

This review of literature is an integral component of the study's evidence-based theoretical framework. To understand the implications of the NICU hospitalization on attachment within the parent-infant dyad, the literature reviewed discusses attachment and its effects on neurobiology and developmental domains. In addition, premature birth and subsequent NICU residency of a preterm infant, and the effects of this experience on parents and the infant were examined. Music therapy interventions and use of music in the NICU are considered, as well as how music interventions affect attachment. These findings inform why a music intervention to promote attachment between parents and an infant in the NICU is imperative for the successful development of the parent-infant dyad.

Attachment

For the purpose of this theoretical framework, attachment is defined as a system of behavior that motivates an infant to pursue meaningful interactions with caregivers in order for their needs to be met (Duft, Stafford, & Zeanah, 2017; Zeanah & Smyke, 2009). Attachment occurs at the earliest stages of life between and infant and their primary caregivers, typically their parents. Attachment is considered the foundation of self-regulation and social-emotional development (de l'Etoile, 2015). Relationships and their formation are the first example of organization that an infant encounters in their development. The earliest interactions with caregivers promote survival for the infant and frame a basis for more complex representations of available and responsive caregiving (Rosenblum, Dayton, & Muzik, 2009). These earliest relationships with caregivers provide satisfaction and enjoyment between the two parties and are essential for an infant's mental health (Zeanah & Smyke, 2009).

Full-term infant attachment. A full-term hospitalized infant is inherently social and primed for sensory experiences that build attachment-based relationships with their primary caregivers (Shoemark, 2013). These relationships and continued interactions are how an infant maintains the connection to their caregivers that assist in their social, emotional, and neurologic development. Face-to-face interactions with caregivers are how humans learn behavioral differentiation and modification skills (Als & McAnulty, 2011; Caine, 2016). An infant who demonstrates behavior modification abilities can successfully organize sensory stimulation because of their ability to regulate themselves through their behaviors when presented with novel stimuli (Hanson-Abromeit, 2003; Haslbeck, 2012; Standley & Swedberg, 2011). The behavioral states impact how an infant comprehends sensory input, whether or not it will engage with or retreat from the environment (Samerhoff, 1978). The states of the infant range from alert, through non-alert waking, fussing or crying, sleep-wake transition, active sleep, to quiet sleep (Samerhoff, 1978; Shoemark, 2013). These behavioral states determine the infant's availability for interaction that will appropriately stimulate them in a way where the infant can still organize the sensory input effectively.

Development of attachment. From eight to 12 weeks, an infant spends more time in a quiet alert state of arousal, with their desire for socialization emerging through observation of their gestures, facial expressions and changes in muscle tone. At twelve to16-weeks-old, an infant can express enjoyment, not just mirror emotions through facial expressions, and also initiate positive vocalizations (Shoemark, 2013). From seven to nine months old, the infant not only recognizes who their primary caregivers are, but also begin to focus their attachment onto that caregiving source. By 12 months old, an infant possesses the ability to use the expressions of those they are attached to and allow those expressions to shape their responses to stimuli in

their environment (Rosenblum, Dayton, & Muzik, 2009). For this development of self-regulation skills to occur, the infant must learn to signal the caregiver and respond to the signals the caregiver reciprocates.

Attachment classifications. Caregiver-infant interactions determine that the attachment figure is a secure base the infant can leave and return to within the exploratory system. The exploratory system is one of several behavior systems that influence attachment through their interactions with one another. The exploratory system is developed through motor skills and improved coordination in infancy. The purpose of the exploratory system is to allow the infant to explore their immediate environment by shutting down the attachment for a brief time period. The infant recognizes the caregiver as a secure base to return to when a need arises that they themselves cannot meet, thus reinstating the attachment system. The fear and wariness system heavily utilizes the attachments that the infant has to determine what responses should be made to strangers or new situations, objects, events, and environments. The final system, sociable and affiliative, is the infant's desire and innate ability to socially engage with others in their environment (Duft, Stafford, & Zeanah, 2017).

The infant's utilization of these behavior systems is one indication of the attachment classification formed with their primary caregiver. Four attachment classifications are noted throughout the literature. The attachment classifications are defined, noting behavioral markers for both the infant and parents. A securely attached infant demonstrates a balance between attachment and exploratory behaviors (Martinez-Torteya, Rosenblum, & Marcus, 2017; Rosenblum, Dayton, & Muzik, 2009). The infant seeks close proximity to their caregivers to ensure contact during unfamiliar situations. The caregivers are responsive, attentive, and sensitive to needs and understand how to effectively interact with the infant. This sensitivity and

empathy in caregiving primes the infant for healthy emotional development (Oppenheim & Koren-Karie, 2009; Sheridan & Nelson, 2009).

Insecure-avoidant attachment manifests itself when an infant suppresses the need for comfort, turning their attention away from their distress and over-utilizing the exploratory behavior system. The infant demonstrates less eye contact and will physically turn themselves from their caregiver, decreasing proximity (Martinez-Torteya, Rosenblum, & Marcus, 2017; Rosenblum, Dayton, & Muzik, 2009). Caregivers tend to discourage comfort-seeking behaviors and are even uncomfortable with responding to the emotional needs of their infant, demonstrating low affective engagement and/or overwhelming emotions toward the infant (Martinez-Torteya, Rosenblum, & Marcus, 2017). This is seen as inconsistent and rejecting to the infant, forcing them to seek an inward method of soothing. When the infant searches for the self-soothing ability, it is not found due to the infant's inability to regulate themselves because of developmental level and needs (Sheridan & Nelson, 2009).

Attachments labeled as insecure-resistant activate the attachment system upon separation from the primary caregiver but fail to deactivate the system once reunion occurs. The infant displays a mixture of contact and rejection with the caregiver and can even appear angry while rejecting the caregiver's interactions aimed at soothing the infant (Duft, Stafford, & Zeanah, 2017; Rosenblum, Dayton, & Muzik, 2009). Caregivers of an infant labeled as insecure-resistant are often inconsistent in their responses to the infant, encouraging the attachment system to be constantly activated so the infant's needs can be met. These caregivers can also be classified as having one-sided insight towards their infant's needs, not able to see the infant's needs as their means of communication at this stage in development (Oppenheim & Koren-Karie, 2009).

Finally, a disorganized attachment classification indicates a mixture of dissociation episodes from the environment paired with secure, avoidant, and ambivalent behaviors from the infant. These attachments are often found in high-risk environments where the infant appears frightened of the caregiver and can even display self-harming behaviors (Duft, Stafford, & Zeanah, 2017; Martinez-Torteya, Rosenblum, & Marcus, 2017). Caregivers are seen as both the source of the attachment alarm and the solution to the alarm due to threatening, frightening, or dissociating behaviors they exhibit (Duft, Stafford, & Zeanah, 2017; Martinez-Torteya, Rosenblum, & Marcus, 2017). Particularly in mothers, disorganized attachments can be a result of clinically significant depression rates (Goodman & Rand, 2009) and a mix of positive and negative insightful attitudes towards the infant's needs (Oppenheim & Koren-Karie, 2009).

Of the four attachment classifications, the secure attachment is the desired outcome for caregiver-infant dyads. These types of attachments frame an optimal canvas where neurological development can flourish, and the infant learns important interpersonal skills (Shoemark, Hanson-Abromeit, & Stewart, 2015) and begin to form as early as eight weeks corrected gestational age (Shoemark, 2013). Critical windows for development occur throughout childhood, with neurological and psychological developmental windows beginning in the first year of life (Shoemark, 2013) with opportunities for the infant to develop self-regulation skills based on the caregiver's availability to meet their needs.

Brain Development

Brain development influencing attachment. These critical periods of environmental stimuli exposure are not only required for brain development, but this is the only period in time that can impact that aspect of neurologic development. Sensitive periods of development occur when the same exposure to environmental stimuli can have the maximum amount of impact on

brain development; however, development outside of these period parameters is still possible. During this time in brain development, synapses form that provide the framework for later responses to stimuli. Two types of synapses are created at this time: experience-expectant and experience-dependent. Experience-expectant synapses form during sensitive or critical periods when minimal experience with stimuli is obtained. Experience-dependent synapses are unique to each individual and require certain experiences to assist in function and development of the brain. These experiences are also unique to the individual and prime the brain for the lifelong process of learning (Sheridan & Nelson, 2009).

A term infant's knowledge of reciprocal participation in cause-effect relationships is key to promote brain development, which mainly occurs during quiet sleep periods (Graven & Browne, 2008). As the infant gathers experiences, their resting periods become the time that the majority of brain development happens. This first stage of brain development occurs when the neural tube is formed in the spinal cord and cortex. The neural tube organizes motor and sensory stimuli and eventually leads to the development of the central nervous system (Sheridan & Nelson, 2009).

The hypothalamic-pituitary-adrenal (HPA) axis is the part of the brain that regulates the production of the chemical cortisol when responding to stressful situations (Sheridan & Nelson, 2009). When an infant expresses a need, this is considered a stressful experience and, depending on how the primary caregiver reacts, this experience can either hinder or promote attachment to that caregiver. When interacting with a caregiver, the stress regulation the interaction involves is a developmental process. When in the womb, the mother solely regulates the infant's environment. Once the infant is postnatal, the responsibility of stress regulation includes both the caregiver and the infant, where the caregiver provides the necessary sensitivity and the infant

learns how to appropriately regulate (Rifkin-Graboi, Borelli, & Enlow, 2009). For a neonatal infant born prematurely, the infant is completely dependent upon the multiple caregivers for regulating emotions and stress.

From birth, the HPA system is highly reactive due to the inexperience of the infant in the environment outside the womb. From approximately 2 to 6 months old, the infant organizes this system through interactions with their caregiver. If the caregiver provides a sensitive response to the infant, a more effective stress regulation response will develop (Sheridan & Nelson, 2009). Emotional regulation affects other areas of the brain including the prefrontal cortex. The prefrontal cortex possesses the ability to singularly communicate emotional reactions to other areas of the brain such as the basal ganglia, the limbic system, and the parietal and temporal regions (Sheridan & Nelson, 2009).

As previously mentioned, cortisol levels elevate in response to a threat. The brain learns to manage these levels and balance these levels through sensitive interactions with primary caregivers. Sensitivity can be defined as the caregiver interpreting and responding appropriately to the infant's signals, so the infant's need is met (Ainsworth, Bell, & Stayton, 1974). The variations in sensitivity can be directly linked to levels of reactive cortisol and psychopathologies that accompany consistently high cortisol levels (Sheridan & Helson, 2009). Stress and trauma are known to elevate cortisol levels until regulation occurs, which, in the case of an infant in stress, is a result of sensitive caregiving. If sensitive caregiving is not consistent, these events are perceived as stressful and traumatic by the infant and their stress hormone levels stay at a constant state of elevation. This inundates the brain and can reduce the growth and functionality of brain tissues in the frontal, parietal, and temporal regions (Smith et al., 2011).

When an infant enters the environment outside the womb, their brain mass increases as behaviors begin to take on more complex and infant-specific characteristics, due to not being solely influenced by the inter-uterine environment (Als & McAnulty, 2011). As the infant develops, attachment experiences are critical. Early deprivation from attachment experiences results in alterations of the brain structure and function. Grey- and white-matter volumes are shown to decrease as well as the volume of the amygdala. Decrease in grey- and white-matter leads to interruptions in connections between the amygdala and prefrontal cortex, which has later implications regarding emotional regulation, executive functions, memory, attention, and planning (Duft, Stafford, & Zeanah, 2017).

Most notably for the purpose of attachment, there is a decrease in electrical activity in higher frequencies of brain waves, which inform higher executive functions such as emotional regulation and social development. An increase in electrical activity in lower frequencies is also noted, resulting in delayed brain maturation due to lack of need for more complex connections (Duft, Stafford, & Zeanah, 2017). These changes in electrical activity influence the amount of usage of the left frontal portion of the brain. The lack of attachment opportunities and increase in stressful experiences results in elevated stress hormone levels, atypical patterns of frontal EEG activity, and lower vagal tone (Goodman & Brand, 2009), all which influence the infant's ability to interact with their environment.

Preterm Infants

Preterm infants desire stimuli from social interaction and sensory input while also requiring increased assistance for regulating reaction and response thresholds due to their gestational age (Als & McAnulty, 2011). Due to early departure from the uterine environment, they have more complex medical and physiological needs than term infants. They also

experience more challenges expressing those needs due to their level of social and emotional development (Smith, Dukhovny, Zupancic, Gates, & Pursley, 2012). Preterm infants are at a greater risk than full term infants for developmental and health problems since they should still be in the womb (Nix & Ansermet, 2009). Preterm infants are often classified in two categories, gestational age at birth and birth weight. Infants born prior to 28 weeks are coined extremely preterm, while infants at 28-33 weeks are very preterm and 34-37 weeks are late preterm. Birthweight categories are as follows: less than 1000 grams is extremely low birth weight (ELBW), less than 1500 grams is very low birth weight (VLBW), and less than 2500 grams is low birth weight (LBW) (Gutbrod & Wolke, 2004; Nix & Ansermet, 2009).

Infants born at 25 to 27 weeks gestational age exhibit a single behavior state where they are neither asleep nor awake. Responses to light are also developing at this point for the infant, as the infant's eyes are newly developed. It is estimated that 10-25 per cent of infants born prior to 28 weeks gestational age will leave the NICU with pervasive developmental disabilities due to their level of need and advanced prematurity. When infants are born at 28 to 30 weeks gestational age, several other senses are developing and require monitoring to ensure a developmentally safe environment for infants. For instance, although the major and minor structures of the auditory system are in place at this time, decreases in response latency to auditory stimulus indicate further auditory and brain processes development up until several weeks after birth. The neurobehavioral system is also not fully developed and cannot maintain survival outside of the womb or continue appropriate development without intervention (DiPietro, Hodgson, Costigan, & Hilton, 1996; Holst et al., 2005; Medline Plus, 2018; Standley & Walworth, 2010).

Infants' lungs are also impacted by inexperience and, although they can breathe air, may require medical intervention to support their development, due to the new development of the air sacs. The air sacs are functional; however, infants are still not ready to breathe outside of the womb environment. Body temperature cannot be stabilized independently at this time infants are unable to produce warmth from the fetal position without assistance (Medline Plus, 2018; Standley & Walworth, 2010); therefore, precautions must be taken to ensure the environment is as conducive to infant development as possible.

Infants born at 31-33 weeks gestational age have a fully developed pain response from newly myelinated nerve pathways. With the increased need for painful, intrusive medical procedures, the pain response is frequently set off in preterm infants (Als & McAnulty, 2011; Hanson-Abromeit, 2003; Nix & Ansermet, 2009; Standley & Swedberg, 2011). The development of the pain response begins at approximately 23-25 weeks gestational age (Nix & Ansermet, 2009; Standley & Swedberg, 2011; Standley & Walworth, 2010), making the need for developmentally sensitive care paramount throughout the NICU admission. Other factors for consideration at this age are the visual acuity of infants – at this time, the eyes are newly developing, and their tracking skills involve horizontal and vertical planes. Infants' activity is also more organized into observable behavior states, which should inform interventionists of whether or not infants are in an appropriate state for interaction (Samerhoff, 1978; Shoemark, 2013; Standley & Walworth, 2010).

For infants born in the 34 to 37-week range, noticeable changes in development occur and should be taken into consideration when interacting with and providing cares. In addition to improvements in eye sight and visual acuity/focusing abilities, infants at this age are also developing the suck-swallow-breathe coordination, grasping movement, and the muscular

strength to lift their heads for brief periods of time. These infants are also showing marked improvements in eyesight and the ability to focus for longer periods of time, as well as their positive responses given to primary caregivers (Duft, Stafford, & Zeanah, 2017; Rosenblum, Dayton, & Muzik, 2009; Shoemark, 2013; Standley & Walworth, 2010). Another change occurring at this time is the amount of total time infants spend asleep. This time not only increases, but infants also begin to actively engage in sleep, with quiet sleep as a possible outcome (Graven & Browne, 2008; Shoemark, 2013; Standley & Walworth, 2010).

After 37 weeks, infants are considered full-term and responses to stimuli are sufficiently developed. Orientation and tracking, both visually and auditorily, is fully developed at this point and the infant can handle a greater intensity and level of stimulation than those born pre-term (Holst et al., 2005; Medline Plus, 2018; Standley & Walworth, 2010). Infants at this age spend the majority of their time (approximately 66 per cent) in sleep, while periods of alertness make up around 10 per cent of their time. These alert times are the ideal situation for interaction to occur, during which infants can now bond with primary caregivers through reciprocal social interaction and demonstration of positive affect in response to pleasing stimulation from these caregivers (Graven & Browne, 2008; Oppenheim & Koren-Karie, 2009; Rosenblum, Dayton, & Muzik, 2009; Shoemark, 2013; Standley & Walworth, 2010).

Infant Medical Conditions. There are common diagnoses and conditions that occur in the neonatal intensive care unit, shown to impact future development of infants (Shoemark, 2013). Diagnoses of congenital heart defects, lung conditions, abdominal wall conditions, digestive conditions, brain injuries, and congenital neurological and circulatory abnormalities affect multiple systems in the body, such as the circulatory, respiratory, digestive, endocrine, lymphatic, and nervous systems (Hanson-Abromeit, 2003; Shoemark, 2013; Standley &

Walworth, 2010). These diagnoses and subsequent effects on the body carry the potential for impacting development over the lifetime.

Impacts on Development. The conditions and diagnoses that warrant an extended NICU stay for infants include painful, frequent medical procedures (Als & McAnulty, 2011; Hanson-Abromeit, 2003; Nix & Ansermet, 2009; Standley & Swedberg, 2011) to effectively treat the issue. Due to the nature of the treatments for common conditions in the NICU, the pain associated with these interventions heightens response to stimulation for extended periods of time. As early as 25 weeks, infants are fully aware of pain sensations (Standley & Swedberg, 2011) as their nervous systems completely develop by 24 weeks gestational age, with the ability to transmit painful stimuli to the brain (Nix & Ansermet, 2009). This continuous exposure to pain can lead to development of cardiorespiratory problems due to inability of neurobehavioral subsystems to regulate (Hanson-Abromeit, 2003), along with impacting the ability of infants to learn appropriate self-regulation skills. There is also a potential for long-term neurologic damage, requiring longer hospitalization (Standley & Swedberg, 2011), with the infant developing a state of traumatic helplessness (Nix & Ansermet, 2009).

Environment of the NICU. The NICU focuses on physiological and medical stability of infants. For premature infants, the extra-uterine environment is too advanced for their development, containing stimuli beyond their capabilities. Instead of state organization being influenced by the mother and womb, infants must now rely on the external rhythms and patterns of the NICU environment (Als & McAnulty, 2011). Characteristics of the NICU include bright lighting, loud noises due to alarms, medical equipment and human voice, frequent testing and procedures and a lack of opportunities for infant and primary caregivers, typically parents, to interact. The auditory environment of the NICU may not provide infants with a clear delineation

between day and night (Hanson-Abromeit, 2003). Some NICUs have implemented quiet hours and other measures to assist in habituating the infants to day and night periods (Matook, Sullivan, Salisbury, Miller, & Lester, 2010). Sounds, lighting, and care routines can be continuous with the stimulation being unnatural, random, and with limited interpersonal interactions between staff and infants. Each of these aspects of the NICU can inhibit the caregiver's ability to provide emotional regulatory support, potentially causing a recurring fear response from the infant (Dardart, 2004).

Developmental care. To combat these extensive and pervasive issues with typical medical care, recommendations for care routines supporting development of preterm infants are becoming more standard in the NICU. In relation to preterm infant care routines, developmentally supportive interventions can be defined environmentally; a supportive intervention means the creation of an environment that is as close as possible to the characteristics of the maternal womb. Supportive interventions encourage the natural growth and development of the infant (Macho, 2017). A theoretical framework for the majority of such interventions is found in the Synactive Theory of Development which asserts that infants are in constant interaction with their environment and these interactions frame their responses to future stimuli (Als & McAnulty, 2011; Hanson-Abromeit, 2003; Macho, 2017).

An example of a developmentally supportive care model, the Newborn Individualized Developmental Care and Assessment Program, or NIDCAP, not only encourages medical staff to provide developmentally sensitive care, but also promotes caregiver-infant interactions throughout the hospitalization. Benefits of implementing NIDCAP early in an infant's admission include a decreased need for oxygen support, increased daily weight gain, fewer days of supplemental feeding, and decreased number of days on mechanical ventilation, as well as

improved development later in life (Moody, Callahan, Aldrich, Gance-Cleveland, & Sables-Baus, 2017). Not only does NIDCAP support development, but also encourages intentional interactions between caregivers and the infant, empowering their sense of ability in caring for a medically complex infant.

NIDCAP was developed in the 1990s as a result of need for infant care that was sensitive to the neurodevelopment of premature infants. The focus of NIDCAP is to observe infant behaviors and create a developmentally supportive care plan that involves the entirety of the treatment team, including parents (Als et al., 1994; Als & Gilkerson, 1997). NIDCAP introduced the concept of developmentally supportive care and influenced the creation of additional programs focused on providing care with infant development in mind such as, Creating Opportunity for Parent Empowerment, or COPE, from Melnyk et al. 2010, Mother Infant Transaction Program, or MITP, from Kaaresen et al. 2006, the Developmental Care Program from Bredemever et al. 2008, and the Support Group Program, by Preyde and Adral, 2003 (as cited in Chen, Zhang, & Bai, 2016).

The Creating Opportunity for Parent Empowerment (COPE) program is an intervention provided to families two to four days after the infant's NICU admission and continued through one week post-discharge to home. The intervention includes instructional DVDs and workbook activities set at an eighth grade reading level that describes their infant's behaviors and physical attributes and provides information on how parents can participate in cares, socialize with, and meet the needs of their infant. The intervention is an adaptation of a COPE program that seeks to strengthen outcomes between parents and critically ill, hospitalized children (Melnyk et al., 2010).

The Mother-Infant Transaction Program (MITP) is another example of an intervention designed specifically for mothers of premature infants. The intervention focuses on empowering the mother to understand and appreciate her infant's behaviors and temperament, emphasizing that these are the infant's primary communication method. The intervention then seeks to assist the mother in learning and adapting to the cues provided by the infant's communication, stating that interactions that satisfy both mother and infant are essential to development (Achenbach, Phares, Howell, Rauh, & Nurcombe, 1990).

The purpose of developmentally guided care programs is to provide individualized care that supports the infant's development and strengthens the family unit of caregivers and infant (Achenbach, Phares, Howell, Rauh, & Nurcombe, 1990; Chen, Zhang, & Bai, 2016; Melnyk et al., 2010). These two components encourage the parents' knowledge of their infant and the infant's neurobiological expectation for the family to nurture its needs (Als & Gilkerson, 1997). When the parents' knowledge is paired with the infant's satisfied expectations, interactions become purposeful and successful. These mutually satisfying interactions both assist the infant in learning essential developmental skills and encourages caregivers to provide cares for their infant (Als & McAnulty, 2011; Askeldottir, Lam-de Jonge, Edman, Wiklund, 2013; Burnham, Feeley, & Sherrard, 2013; Chen, Zhang, & Bai, 2016; Conrad, 2010; Zeanah & Smyke, 2009).

Many facilities find the actual implementation of developmentally supportive care to be challenging. The main tenets of the NICU consist of caring for an infant in an individualized, consistent format that encourages and supports the family unit (Valizadeh, Asadollahi, Gharebaghi, & Gholami, 2013). Medical staff have many responsibilities. The majority of parents do not fully care for their infant until transitioned home due to the medical fragility of their infant in the NICU (Burnham, Feely, & Sherrard, 2013). Parents also have many concerns

and questions about their infant during the hospitalization period. Training and encouragement to alleviate the stress and anxiety that accompanies having a medically complex infant can assist parents in learning appropriate caregiving techniques. Placing the added task of discharge teaching and encouragement of autonomy on the medical staff when other allied health professionals could assist in this process results in developmental care remaining an afterthought instead of a priority.

Parent/caregiver experience in NICU. Along with the infant NICU experience, it is essential to also discuss the experience of the parents and primary caregivers while their infant is hospitalized. Access to the infant, as well as interactions with them are limited in the NICU due to the medical complexity of the infant (Burnham, Feeley, & Sherrard, 2013). Oftentimes, parents are not qualified to perform basic cares on the medically compromised infant this basic care typically provides the main mode of bonding within the first weeks of life, priming the infant for attachment. These experiences are seen as imperative when implementing family centered care because they reinforce the parents as the primary caregiver and nurturer of the infant (Dellenmark-Blom & Wigert, 2014). When parents are capable of resuming the primary caregiver role, they spend time learning the infant's behavioral cues and becoming the expert on their needs. The caregiving opportunities can also assist in rebalancing emotions that are necessary for attachment formations between the parents and infant.

An infant's admission to the NICU affects the entire family unit. Based on the parent experience, the NICU treatment course can be split into 4 phases as the family transitions from the NICU to home. The first phase, Premature Parental Onset, begins as soon as the infant is born and placed in the NICU. Parents often experience fear, emptiness, and hysteria during this time with concerns about infant death and their inability to physically bond with the infant

directly following their birth. The second phase, Parental Incompleteness, focuses on the parents' first visit to the NICU. Feelings of surprise, guilt, and disappointment are common, possibly because of the inability to hold the infant or the fact that the mother was discharged home without the infant (Hutchinson, Spillett, & Cronin, 2012).

Phase three, Parental Involvement, is heavily dependent on the infant's medical state. If the infant is progressing in their treatment, this phase will involve the parents with the infant, increasing interactions significantly as parents learn to care for their infant. If the infant experiences complications, parent visitation can be restricted, and interaction times will decrease. Due to the range of possibilities in this phase, feeling a loss of control is common. Emotions include joy, ambivalence, and nervousness due to their perceived lack of knowledge on how to help their infant. The final phase, Parental Completeness, focuses on the discharge of the infant from NICU to home and the final teaching aspects of the medical staff, including setting up post-discharge medical care (Hutchinson, Spillet, & Cronin, 2012). Parents experience emotions ranging from frustration, fear, and joy due to the concern of caring for a medically complex infant paired with the relief of leaving the hospital environment (Garfield, Lee, & Kim, 2014; Hutchinson et al., 2012).

The feelings and emotions discussed can lead to decreased interactions with the infant and, as a result, insecure attachment between the infant and caregivers. Caregivers play a crucial role in the development of emotional regulation for infants. Face-to-face interactions promote attachment and bonding, which in turn influences emotional and social development (Caine, 2016). Touch and tactile stimulation associated with these interactions are another key part of the parent's role in caring for a newborn whether full-term or pre-term. A cornerstone of

developing a secure attachment is the caregiver responding to the infant's signals for comfort through touch (Duft, Stafford, & Zeanah, 2017).

Parent/caregiver attachment history. These components of attachment are influenced by the attachment history of the parents. Attachment history can be understood through administration of the Adult Attachment Interview and broken down into one of four categories (Hesse, 2008). Secure-autonomous adults have an objective lens through which they see experiences in relationships. Dismissive adults attempt to de-value the attachment portion of relationships through their dialogue, assuming that they are strong enough to handle negative events independently. Preoccupied attachment manifests itself when adults seek affirmation for their views and experiences from childhood (Hesse, 2008). These attachment classifications for adults focus on the manner in which adults recall and discuss their relationships from childhood. There is a direct correlation between the parent's description and recall of their attachment relationships and the attachment classification developed by their child (Hesse, 2008; Murphy et al., 2014). Due to this correlation, the treatment team can provide support during the infant's hospitalization to encourage a secure attachment between the parent and infant (McAlpin, 2008).

Post-partum depression and attachment. The mental health of the parents is another factor that should be considered when discussing attachment. While in the NICU, families can experience stress, anxiety, depression, and PTSD (post-traumatic stress disorder) from the abnormal environment and situation that their family experiences. These diagnoses of the parents can affect the ability to appropriately bond with their infant, with maternal anxiety affecting interactions between the mother and infant for up to 24 months CGA (Smith, Hwang, Dukhovny, Young, & Pursley, 2013). Maternal diagnosis of post-partum depression (PPD) also alters the quality of attachment between the mother and infant due to the mother's lack of

reliable and responsive interactions toward the infant's needs (Goodman & Brand, 2009). As post-partum depression alters the chemical balance of the brain, it is important to note that this also affects the mother's ability to attach securely to the infant.

Parental autonomy in the NICU. Due to the many factors influencing the NICU experience, parents can find it difficult to place themselves in the role of primary caregiver of the infant (Nix & Ansermet, 2009). As the hospitalization progresses and discharge nears, parents are expected to take on more responsibility caring for the infant to promote a smooth transition from hospital to the home environment. However, if parents are insecure about their ability to care for the infant, they are more likely to have difficulty with the infant post-discharge which can influence parent-infant relationships negatively (Nix & Ansermet, 2009). Caring for an infant, especially a medically complex one, can seem daunting; it is something to be learned, not something innate. While this is true for some of the cares required, there are aspects of infant care that are engrained within human beings, such as the need for attachment and the ability of the caregivers to provide that relationship. Postpartum care, whether for preterm or full-term infants, should seek to provide an environment that promotes family attachment and autonomy of the parents to fully care for their infant (Askelsdottir, Lam-de-Jonge, Edman, & Wiklund, 2013).

Autonomy is often framed in the context of how it is available to individual patients in a medical setting and may not include family systems. Patient autonomy is defined as having the following attributes: being identified, first and foremost, as a person, having the overall understanding to act on information provided, responsibility over one's actions and the re-construction of any information or education gathered in order to implement it into practice (Lindberg, Fagerström, Sivberg, & Willman, 2014). Thus, this definition must be discussed and modified to reflect the need for parental autonomy in a medical setting when the patient is an

infant in the NICU. During hospitalization, patients seek to be seen as humans and not simply a diagnosis (Lindberg et al., 2014). When the patient hospitalized is a medically fragile infant, the parents of the infant can feel a disconnect in the relationship due to the infant requiring complex medical intervention; therefore, limiting the amount of time the parents have to attach with the infant and care for them as with a full-term infant. In these situations, parents can lack the knowledge that their infant is not only their own, but also a baby that requires non-medical attention and care in order to develop typically. Assisting the parents in seeing the baby as their own is an aspect of autonomy that assists them in eventually caring for the infant completely on their own.

The capacity to act as an autonomous patient describes the ability of the patient to demonstrate clear, active decision making concerning their treatment and care (Lindberg et al., 2014). As parents in the NICU setting, there are not always opportunities to provide care for the infant due to the nature of their needs – primary, of which, are the physiological and medical stability. Parents must feel empowered to make decisions for their infant, so they continue to make those choices without hesitation or need for further input. When a parent is able to articulate and carry out the process of informed decision-making in a hospital setting, this skill can later be transferred to decision-making and caring for the infant in the home environment.

In a situation where a parent has an infant in the NICU, a mistake made can feel like a failure to adequately care for the child. This mindset is also present in parents of full-term infants; however, there are specific barriers that parents in the NICU face when learning about their infant. Barriers include the following: cares that medical staff are required to perform, fear from the parents about their own abilities, and reliance on medical staff to care for the infant. However, a part of patient autonomy is taking responsibility for the actions and consequences of

said actions while in a medical setting (Lindberg et al., 2014). In order to effectively care for the infant outside of the hospital context, parents must be able to take responsibility for the act of caring for the infant. Supports within society (family, friends, other parents, etc.) offer valuable insight and assistance when needed; however, parents should still feel comfortable with their own decision-making and the natural consequences that stem from their choices.

The process of autonomy is one of individual, time-sensitive, and contextual character, all of which inform change throughout different stages (Lindberg et al., 2014). Mental and physical capacity along with staff-family interactions also contribute to the achievement of autonomy (Moser et al., 2007 and Sakalys, 2010, as cited in Lindberg et al., 2014). From complete dependency, to a combination of decision-making and receiving input from others, to fully making decisions, parents of an infant in the NICU must become the expert on and the advocate for the infant before discharge to the home environment is appropriate.

Re-construction is the final aspect of patient autonomy. It describes the idea that in a constantly changing environment (e.g. a medical setting), autonomy consistently and frequently undergoes alterations (Lindberg et al., 2014). These alterations must be taken into account when parents are learning to care for their infant in the NICU. This indicates that once a particular characteristic of autonomy is achieved, re-construction must happen to integrate the newly-acquired skill into the practice of everyday life. What is observed from the characteristics of autonomy is the overarching theme that it is attaining a basic capacity for reasoning or critical competence (Franklin-Hall, 2013). This reasoning and competence is bred from experience that requires autonomous behavior, such as learning to care for a medically complex infant before discharge from the hospital to home. A possible way to gain this experience is through a music

intervention implemented by a music therapist that educates parents on appropriate caregiving techniques for their premature infant.

Music use in the NICU to promote parent-infant interactions

The use of music in the NICU originated for purposes such as procedural support, pain management, and stress reduction, all focused on the infant receiving appropriate and organized sensory stimulation (Olischar, Shoemark, Holton, Weninger, & Hunt, 2011; Standley & Swedberg, 2011; Standley & Walworth, 2010). Music therapy has recently implemented interventions for attachment and neurologic treatment in the NICU (Shoemark, Hanson-Abromeit, & Stewart, 2015). Music is seen as a shared experience between the parent-infant dyad (Abad & Edwards, 2004; Delavenne, Gratier, & Devouche, 2013; Edwards, 2011; Shoemark, 2013; Shoemark et al., 2018; Standley, Walworth, Engel, & Hillmer, 2011) that can be an asset in family-centered care. Family-centered care in the NICU is defined as respect and empowerment of the family unit, where the infant's specific needs are considered along with a focus on engaging parents in decision-making and caring for their infant (Sudia-Robinson, 2011).

In family-centered care involving music therapy treatment, music is the initial shared interaction between parents and infant that sustains the interplay of the two parties (Shoemark, 2013; Shoemark et al., 2018). During this time of engagement with each other, parents learn the infant's mannerisms, signals, and cues and how to respond so the infant's needs are met (Burnham, Feeley, & Sherrard, 2013; Haslbeck, 2013; Shoemark, 2013; Standley, Walworth, Engel, & Hillmer, 2011; Thompson, 2012). Communication, particularly between parents and infants, can be seen as inherently musical (Shoemark, 2013; Shoemark et al., 2018). Music

functions as a vehicle for emotional expression and regulation of social behaviors. The music can also be used as an experience in relational skill development because of the similar properties that music and communication, specifically verbal, share (Edwards, 2011; Haslbeck, 2013; Valizadeh, Asadollahi, Gharebaghi, & Gholami, 2013). An infant is able to process the timing and metrical structures found in music and respond to them, making music an ideal medium through which bonding can occur between parents and infant (Delavenne, Gratier, & Devouche, 2013).

Infant-directed singing. Music can impact a variety of domains that influence attachment and future development, including emotional expression, social and communication skills (Edwards, 2011; Haslbeck, 2013; Thompson, 2012), language development (Standley & Walworth, 2010), and self-regulation (de l'Etoile, 2015; Haslbeck, 2015; Loewy, Stewart, Dassler, Telsy, & Homel, 2013). One specific intervention that affects a range of domains is infant-directed (ID) singing. Developed for music therapy purposes from a theoretical framework, ID singing has a variety of qualities that make it innately appropriate and natural for parents to utilize when interacting with their infant (de l'Etoile, 2006a, 2006b). ID singing involves simple rhythms, a loving tone, expressive singing, a slower tempo, sustained vowels, gliding between pitches, and higher pitch levels in either a lullaby or play song form (de l'Etoile, 2006b; Haslbeck, 2012; O'Gorman, 2007; Trehub, Unyk, & Trainor, 1993).

When ID singing is implemented, it promotes sustained attention to caregivers (de l'Etoile, 2006a), increasing the amount of time and opportunity for attachment between parents and infant. ID singing also assists in the development of self-regulation behaviors through the interaction, giving the infant opportunities to practice attention control and arousal modulation (de l'Etoile, 2015). An infant who interacted with their parents through ID singing also

demonstrated lower levels of physical behaviors during interactions, conserving calories for growth rates that increased their weight gain and led to quicker discharges from the hospital (de l'Etoile, 2006a). It has also been suggested that ID singing can promote a reciprocal communication style that assists in the formation of attachment between parent and infant because of the way in which the parent reacts to the infant (Hanson-Abromeit, 2003). The parent is empathetically observing the infant and responding to their cues in a manner that is not always readily available in the NICU (O'Gorman, 2007).

ID singing focuses on the parent-infant dyad having the main interaction with the music therapist supporting this interaction to further the development of attachment between the parent and infant. Parents arouse or soothe the infant with singing through modeling and specific instruction from the music therapist then respond to the infant's physiological and behavioral cues (O'Gorman, 2007; Shoemark, 2013). When parents understand the differences between neonates and full-term infant responses to stimuli, they are able to care for them appropriately (Haslbeck, 2012). Confidence in the caregiving not only increases the quality of the interaction, but also empowers the attachment process between the parent and infant (Haslbeck, 2013), which is a key component of readiness for discharge and secure attachments between an infant in the NICU and parents (Benitz & Committee on Fetus and Newborn, 2015; Bernstein, Spino, Lalama, Finch, Wasserman, & McCormick, 2013; Burnham, Feeley, & Sherrard, 2013; Chen, Zhang, & Bai, 2016; Nix & Ansermet, 2009; Smith, Dukhovny, Zupanic, Gates, & Pursely, 2012; Smith, Hwang, Dukhovny, Young, & Pursley, 2013).

Problem Statement

The premature birth of an infant is a uniquely stressful experience for the family unit. Due to the medical complexity and need of the infant, parents are often left with little interaction

time with their child. This can lead to issues with attachment development, which is considered the basis of self-regulation and social-emotional development (de l'Etoile, 2015). Developmental care programs in the NICU assist with supporting the infant's development along with the family's needs and the attachment between the parents and infant, which can strengthen the parent's confidence in caring for the infant and the family unit as a whole (Als & Gilkerson, 1997). Music can be an integral part of family- and developmentally-centered care that supports attachment of infant and parent (Shoemark, Hanson-Abromeit, & Stewart, 2015). Currently, there is a lack of literature that supports the implementation of developmentally sensitive music interventions that promote parent-infant attachment in the NICU. This whole in the research indicates that further work needs to be done to ensure an infant receives care from its parents that is developmentally supportive and appropriate throughout the developmental trajectory.

Purpose Statement

The purpose of this study was to understand the process of attachment and how the NICU impacts the development of this construct between parents and their infant in order to create an evidence-based theoretical framework for music intervention that can promote attachment between parents and an infant in the NICU. The researcher completed the following tasks to achieve this purpose: integration of noted theories into a causal model that outlines the theoretical framework, presentation of a rationale for the music intervention and articulation of its benefits for parents and infants in the NICU.

Chapter 3

Theoretical Framework

Secure attachments formed between an infant and caregivers are essential for development and growth of the infant and family unit (Duft, Stafford, & Zeanah, 2017; Haslbeck, 2012; Martinez-Torteya, Rosenblum, & Marcus, 2017; Rosenblum, Dayton, & Muzik, 2009). The purpose of this study was to understand the process of attachment and how the NICU impacts the development of this construct between parents and their infant in order to create an evidence-based theoretical framework for a music intervention that promotes attachment between parents and an infant in the NICU. The review of literature identified and defined the concept of attachment and the aspects of the NICU stay that impact its development. This chapter defines formal theories of the Transtheoretical Model of Behavior Change, Maslow's Hierarchy of Needs, Als' Theory of Synaptic Development, the Pediatric Psychosocial Preventative Health Model, and constructs of causal modeling in order to develop a theoretical framework for a music intervention that promotes attachment between NICU parents and their infant (Als, 1982; Kazak, 2006; Maslow, 1943, 1954; Prochaska & Velicer, 1997). The results chapter defines the variables of causal modeling within the context of the Hierarchy of Needs, taking into account the Synactive Theory of Development and the Transtheoretical Model of Behavior Change (Als, 1982; Maslow, 1943, 1954; Prochaska & Velicer, 1997). The hierarchies of need are placed within the structure of the Pediatric Psychosocial Preventative Health Model to best inform the course of intervention necessary for the parents and infant (Kazak, 2006). These components create the evidence-based theoretical framework for a music intervention promoting attachment between parents and an infant in the NICU. The final chapter focuses on

the strengths and limitations of the theoretical framework, as well as future implications for music therapy practice and research.

Transtheoretical Model of Behavior Change

The Transtheoretical Model of Behavioral Change was developed by James Prochaska and Wayne Velicer. Prochaska and Velicer (1997) sought to introduce a model that integrated the over 300 theories present in psychotherapy by identifying processes and stages of change in health behaviors. The model references multiple psychotherapeutic perspectives including consciousness as related to Freud, Skinner's thoughts on contingency management, and helping relationships as defined by Rogers (Prochaska & Velicer, 1997). Literature was surveyed from a variety of health and mental behaviors requiring intervention ranging from addiction (alcohol, substance abuse, smoking), mental health diagnoses (anxiety, depression), and prevention (mammogram screenings, AIDS, unplanned pregnancy) in order to explicitly describe change over a period of time (Prochaska & Velicer, 1997).

Stages of Change

Prochaska and Velicer (1997) identified the following stages of change; precontemplation, contemplation, preparation, action, maintenance and termination. The stages reiterate change as a sequential process and not a singular event. The stages of change and associated activities of the Transtheoretical Model of Behavior Change are defined and situated within the parameters of the parent-infant experience in the NICU (Prochaska & Velicer, 1997).

Precontemplation. This stage describes when individuals are not seeking to change their behavior or actions. Individuals can perceive the change as unachievable due to their past experiences or can lack understanding of the consequences of their behavior at this stage

(Prochaska & Velicer, 1997). In terms of parent-infant experience in the NICU, precontemplation defines the point at which parents are unaware of their behaviors or the infant's experience, even less so, and how their actions and their infant's perception of said actions may affect the attachment process. This stage can also be a time when parents do not feel adequately prepared to work with their infant in a way that facilitates attachment (Benitz & Committee on Fetus and Newborn, 2015; Bernstein, Spino, Lalama, Finch, Wasserman, & McCormick, 2013; Dellenmark-Blom & Wigert, 2014). A music intervention designed to promote attachment between the infant-parent dyad while in the NICU can include teaching that will assist the family in utilizing techniques that are developmentally and environmentally appropriate. During the precontemplation phase, the intervention may involve a period of evaluation to determine whether the family requires support in the area of attachment.

Contemplation. The second stage defines the point at which people intend to make the change. There is a balance of understanding that is present at this stage, where the individual recognizes the pros and cons of altering the behavior. Because of the knowledge gained in precontemplation, individuals can remain in this stage for long periods of time, due to perceived concern about the change (Prochaska & Velicer, 1997). For parents in the NICU, this stage directly relates to the period in time where education and teaching about the infant begins, yet there is still a considerable amount of fear and self-doubt from the parent about being able to care for the infant without the support of the treatment team (Chen, Zhang, & Bai, 2016; Moody, Callahan, Aldrich, Gance-Cleveland, & Sables-Baus, 2017). For music therapists, this is an opportune time to begin implementation of an intervention to promote self-efficacy in the parents. If the family is deemed as requiring services from the music therapist from the

assessment, the music intervention is introduced at this time with the therapist modeling the intervention for the parents.

Preparation. The preparation stage is when individuals decide that action will be taken in the near future. This stage also involves a plan of action that the individual has decided upon to help promote the behavior change (Prochaska & Velicer, 1997). In the NICU, this is when pparents will begin to learn how to appropriately interact with and read the cues of their infant (O'Gorman, 2007; Rinehimer, 2017; Shoemark, Hanson-Abromeit, & Stewart, 2015). The music therapist will still facilitate the intervention fully but will begin to explain the components of the intervention so that the parents have a clear understanding of the infant's needs and how to address them. This is the time when building a relationship between the parent and music therapist grounded in trust and understanding becomes essential to the effectiveness of the intervention. A sense of trust may result in more willingness to share feelings and experiences with the therapist. These feelings and experiences can be deemed socially unacceptable to discuss due to parent's perception that caring for their infant should be a natural role for them to assume and not a skill to be learned (Bernstein, Spino, Lalama, Finch, Wasserman, & McCormick, 2013; O'Gorman, 2007; Rosenblum, Dayton, & Muzik, 2009). Parents may therefore perceive that these discussions should not occur, even with a trained professional. However, these resistant feelings may inhibit the intervention process. Thus, trust and open communication are essential between the therapist and parent dyad (Kurth, Spichiger, Stutz, Biedermann, Hosli, & Kennedy, 2010).

Action. Action is the most observable stage in the behavior treatment process. Specific modification for the behavior is made at this time but these modifications should be based in a type of treatment model that is sufficiently able to alter the behavior (Prochaska & Velicer,

1997). When parents in the NICU enter this stage of behavior change, they will begin to implement the intervention alongside the music therapist. The action stage is where rapport in the relationship will continue to be built along with parental empowerment and autonomy. Empowerment is defined in this context as intrinsic motivation, based in personal and interpersonal power acquired through resources and education, that promotes individuals, families or communities to improve their circumstances through actions (Holcomb-McCoy & Bryan, 2010). As the parents demonstrate increasing competency with the intervention, the music therapist will begin to shift the roles of the two parties in the intervention, with the music therapist being secondary in the treatment to the parents, then eventually allowing the parents to fully implement the intervention in the proceeding stage of the model.

Maintenance. The maintenance stage focuses on preventing regression back to the original behaviors, with growth occurring less frequently than in the action stage. Confidence of the individual in their ability to alter this aspect of their life long-term increases because of success over time (Prochaska & Velicer, 1997). At this stage of the music intervention, parents are solely responsible for implementation with the music therapist present for support and encouragement to continue the development of autonomy and empowerment in the parents.

Termination. The final phase of the model, termination, presents an individual with full autonomy. Individuals in termination can choose the appropriately changed behavior over the previous at any point in time, regardless of emotion or circumstance (Prochaska & Velicer, 1997). Parents of an infant in the NICU demonstrate appropriate attachment-promoting behaviors and the music therapist should begin to terminate services. This termination process requires explicit communication between the parents and music therapist with the understanding that their treatment is complete because of their success in cultivating autonomy. This stage

should also emphasize that parenting can be a community effort and that it is not the sole responsibility of the parent to meet every need of the infant; rather, they are teaching the infant, through interactions, how to successfully self-regulate (Conrad, 2010).

Processes of Change

Processes of change are divided into two areas of change, individual and organizational. Individual processes include those processes that are personally initiated and that deal with reframing the behavior through alterations in thoughts and actions (Levesque, 2001). Individual processes include consciousness raising, dramatic relief, self-reevaluation, and environmental reevaluation as the first areas of improvement that focus on making the individual aware of the need for behavior change. Self-liberation, social liberation, contingency management, and counterconditioning assist the individual in achieving this behavior change by providing them with new skills to initiate the behavior change. Helping relationships and stimulus control are the final processes that ensure the individual can maintain the behavior change over a substantial period of time (Levesque, 2001). Often, these processes will be implemented under the guidance of a health professional in order to promote the most effective, seamless transition from the unhealthy behavior and lifestyle to the healthy version. Organizational processes, share many of the same components as individual processes. The purpose of the organizational level is to encourage the use of individual processes and are the point in behavior modification treatment where the health professional becomes a support and the individual becomes the guide in the process of change (Levesque, 2001).

Individual Processes

Consciousness Raising. This process defines an increased awareness of the behavior that requires modification. The background information of the behavior manifestation, the

consequences of continuing the behavior, and the potential changes for the behavior are all learned during this stage (Prochaska & Velicer, 1997). Parents in the NICU are subject to a uniquely stressful and challenging environment that negatively impacts the ability to attach to their infant (Favez, Frascarolo, Keren, & Fivaz-Despeursinge, 2009; Nix & Ansermet, 2009). Individualized consciousness may be raised through a shared assessment that helps determine is a music intervention is appropriate to facilitate the attachment process. Organizational consciousness raising could focus on a parental choice component of how the intervention is set up in order to best meet the needs of the family unit.

Dramatic Relief. Emotion is a key component of this process and is utilized to assist the individual in understanding their need for behavior modification (Prochaska & Velicer, 1997). Several therapeutic techniques can achieve this type of emotional exploration (Prochaska & Velicer, 1997). For this theoretical framework, relief techniques would include engagement with the grief process and personal testimonies. A period of discussion about the NICU experience and the parents' emotions and circumstances can help to inform the music therapist of how best to facilitate the intervention (Garfield, Lee, & Kim, 2014; Hutchison, Spillett, & Cronin, 2012; Nix & Ansermet, 2009). When transitioning to the organizational process of dramatic relief, the music therapist can prompt the parents to discuss why these emotions and circumstances could affect their relationship with their infant. This assists the parents in understanding how their own experiences and emotions impact their infant's ability to develop a secure attachment.

Self-reevaluation. Self-reevaluation requires awareness of how the change in behavior will impact the individual's self-image. This impact is felt both cognitively and affectively by the individual, which influences the decision of whether or not to modify the behavior (Prochaska & Velicer, 1997). The behavior change should be discussed in this manner because

it will inevitably alter the individual's own feelings about themselves. When discussing the impact of attachment on future development with the parents of an infant in the NICU, the music therapist should outline how the music-based intervention can promote this attachment while also ensuring that the parents' own emotional needs are addressed (Abad & Edwards, 2004; de l'Etoile, 2015; Edwards, 2011; Haslbeck, 2012; Shoemark & Dearn, 2008; Shoemark, 2013). Organizationally, the music therapist should seek input from the parents and promote a sense of parental ownership in the intervention.

Environmental reevaluation. Much like self-reevaluation, environmental reevaluation focuses on how the potential behavioral change will impact the individual's environment (Prochaska & Velicer, 1997). Differing from the previous process, environmental reevaluation takes into account the environment, as well as the individuals in the environment and the impact of behavior change on the environment. The same measures should be taken by the music therapist in this process to inform the parents of how insecure attachment impacts the infant's development and their interactions with the environment, while also asking the parents to hypothesize about attachment and provide their own synopsis of their attachment history.

Self-liberation. Self-liberation combines two thought processes from the individual in order to commit to the behavior change. The first is believing that they can change their behavior, followed by their commitment to the change based off of their belief (Prochaska & Velicer, 1997). Providing choice is an effective method for promoting self-liberation and building autonomy. For the music-based intervention discussed in this theoretical framework, autonomy and empowerment of the parents is essential to the development of attachment in a unique setting like the NICU (Hanson-Abromeit, 2003; Nix & Ansermet, 2009). The music therapist should provide choice where appropriate to encourage autonomy in the care of the

infant from the parents. As the parents become more comfortable with the intervention, the therapist should transition from offering choice to allowing the parent to gradually begin leading the session and making the decisions for how the intervention proceeds.

Social liberation. When changing a behavior, feelings of deprivation or oppression can arise due to the inability to continue the original lifestyle. Advocacy for the individual's rights and empowerment of their choices are major components if social liberation (Prochaska & Velicer, 1997). Social liberation focuses on providing an increase in opportunity for the individual that gives an alternative behavior to engage in at times when the original behavior was utilized.

Parents must learn the signals of the infant when they are in a state of need, an experience that they are often deprived of when their infant is in the NICU. The music intervention encourages attachment between the parent-infant dyad by giving an option for a behavior that allows the parent to care for the infant but still provides the security of the medical staff to continue supporting the infant's other, more critical needs (Abad & Edwards, 2004; de l'Etoile, 2015; Edwards, 2011; Haslbeck, 2012; Shoemark & Dearn, 2008; Shoemark, 2013). As the intervention progresses, the music therapist and medical staff should begin to provide less support in order to promote parental autonomy.

Organizational Processes.

Counterconditioning. When seeking to eliminate unproductive or potentially harmful behaviors, there is a need for substitution of healthier, appropriate behaviors as opposed to the original behavior being modified (Prochaska & Velicer, 1997). Much like social liberation, counterconditioning focuses on promoting interactions between the parent and infant, where the parents learn to care for the infant while still receiving support from the medical staff. The

music therapist can provide such alternatives in behavior through the intervention components. When parents become more comfortable executing these substitute behaviors, prompts for the new behaviors by the music therapist should be removed.

Stimulus Control. The purpose of stimulus control is to prompt positive behavior alternatives that will eventually remove cues for the original behavior (Prochaska & Velicer, 1997). Encouraging a change that reduces possible return to the original behavior is the main objective. For the music intervention, stimulus control involves reinforcement of the parental behaviors that support attachment while simultaneously educating and coaching the parents with new techniques to strengthen the secure attachment. The intervention may have levels where the music therapist may shift from an education and coaching role to a supportive role, allowing the parents to educate the staff on the infant.

Contingency Management. Contingency management involves setting up consequences for steps in the direction of either recovery or relapse. These consequences can be positive or negative in nature and should seek to encourage the change to a positive behavior (Prochaska & Velicer, 1997). Prochaska and Velicer (1997) found that rewards were a more effective method for self-changers than the sole use of punishments. Rewards in the context of the music intervention would focus on the responses from the infant based on the parent's ability to meet the infant's needs. The intrinsic reward of self-efficacy and autonomy in caring for a medically complex infant, paired with the extrinsic reward of support from the parent's community, can assist in secure attachment and promote a seamless transition during discharge from the hospital.

Als' Synactive Theory of Development

The Synactive Theory of Development proposes that the infant is constantly experiencing stimuli and that each subsystem's interactions with each other and the environment inform how

the infant handles the sensory input. A newborn infant possesses the ability to quickly regulate the majority of its systems. However, an infant often experiences challenges regulating its attentional-interactive system which combines all other systems, along with the environment and the behavioral stage that the infant is in, based on developmental level. Due to inexperience in the extrauterine environment, the amount and intensity of the stimuli can be a challenge for the newborn infant to process. A preterm infant adds another layer of complexity, due to early expulsion from the womb and underdeveloped biological systems. The Synactive Theory of Development utilizes three constructs to demonstrate how behavioral development is organized: systems of the infant, the environment the infant is in, and the infant behavior based on gestational age (Als, 1982).

Infant systems. The systems of the infant are labeled based on where they occur in the developmental trajectory. These systems all interact with one another as they develop and inform the infant of how to process stimuli from the environment. These systems are also dependent upon the infant's behavioral development and gestational age (Als, 1982).

Autonomic system. The autonomic system is the first to develop in the infant. It ensures that the infant's baseline functions are stabilized when stimuli are processed. The autonomic system can be observed with the infant's respiration, changes in color, tremors, bowel movements, gagging, or hiccoughing. The full-term infant can typically regain stability of this system quickly after birth, however a preterm infant is at risk due to some of the aspects of this system being underdeveloped and unable to function in the extrauterine world (Als, 1982).

Motor system. The infant's motor system controls its movements, postures, and tone. Motor system functions become easy for the full-term infant to control once they are used to the extrauterine environment, typically within a few hours. Their movements become smoother and

their posture varies more flexing and extension. A preterm infant's motor system is underdeveloped and relies on the autonomic system – often also not functioning at capacity due to immaturity. When the motor system experiences this loss of support, it begins to function on its own, which can negatively impact future development of sensory organization (Als, 1982).

State system. The state system of the infant determines the level of alertness that the infant is in, including different sleep, wake, and arousal cycles. A full-term infant is usually able to manage these states and flow seamlessly between them, although caregiver involvement during those transitions is still ideal in order to teach the infant the most efficient means for moving between the cycles. A preterm infant experiences difficulty with modulating between cycles due to immaturely developed behaviors and the other underdeveloped systems that the state system relies on, autonomic and motor (Als, 1982).

Attentional/Interactive system. As the full-term infant adjusts to the world and stimuli outside the womb, the goal is to encourage longer periods of alertness, when developmentally appropriate. This entails transitioning from more definitive sleep states to periods of alertness where the infant's behaviors and signals indicate they are ready to participate in interactions (Samerhoff, 1978; Shoemark, 2013). The entire process hinges on appropriately developed systems and behaviors of the infant, which are often not present in a preterm infant who are out of the intrauterine environment before they are fully developed. Extra precautions and adaptations must be made in order to understand the preterm infant's cues and recognize when interaction is appropriate (Als, 1982).

Infant environment. Environment includes conception, the intrauterine environment, the extrauterine environment, and the world at large. The extrauterine environment can be either in the world or in an isolette depending on the gestational age and needs of the infant at birth.

The infant's environment includes both the sensory and social components. The sensory environment requires all systems to work in tandem to provide regulation of the input for the infant. Socially, the environment is composed primarily of caregivers for the full-term infant, who learn the infant's cues for interaction while also learning appropriate attention regulation strategies (Als & McAnulty, 2011; Caine, 2016).

A preterm infant's signals for interaction are not only different, they also do not have the same cyclical interchange as that of a full-term infant because of their immature systems (Als & McAnulty, 2011; Hanson-Abromeit, 2003; Haslbeck, 2012). These same systems also affect how sensory information is received. Often, the sensory information cannot be regulated by the preterm infant because of the same immaturity in those systems (Als, 1982). Particularly in the NICU environment, sensory stimulation can be inappropriate for the still developing systems of the preterm infant (Hanson-Abromeit, 2003; Haslbeck, 2012; Nix & Ansermet, 2009).

Infant behaviors. The infant's behaviors depend on gestational age and also correspond with how they interact with the environment. Beginning at approximately 24 weeks, a human fetus can live outside of the womb with appropriate medical care in the NICU. At this stage of development, the infant is displaying rapid eye movements as the main behavior – a fitting response because the infant's eyes are underdeveloped and inexperienced, making them sensitive to extrauterine stimulation (Als, 1982; DiPietro, Hodgson, Costigan, & Hilton, 1996; Holst et al., 2005; Medline Plus, 2018; Standley & Walworth, 2010).

By 25-27 weeks, respiratory movements are demonstrated by the fetus. When in the extrauterine environment, the infant requires medical intervention due to the immaturity of the lungs (Medline Plus, 2018; Standley & Walworth, 2010). The inability of the lungs to function outside of the womb and the consistent stimulation present in the NICU can also impact the

lungs because of the inability for neurobehavioral regulation (Hanson-Abromeit, 2003). From 28-36 weeks, the infant continues to develop in the NICU and shows increased organization in behaviors and signals indicating a desire for interaction (Duft, Stafford, & Zeanah, 2017; Rosenblum, Dayton, & Muzik, 2009; Samerhoff, 1978; Shoemark, 2013; Standley & Walworth, 2010).

After 37 weeks, the infant can survive in the world at large, barring no medical complications. At this time, the duration and intensity of stimulation that the infant can successfully organize and attend to is increased, as well as their responses to caregivers during interactions (Graven & Browne, 2008; Holst et al., 2005; Oppenheim & Koren-Karie, 2009; Rosenblum, Dayton, & Muzik, 2009; Shoemark, 2013; Standley & Walworth, 2010). This stage of development includes all systems interacting with each other and the environment, with the infant ready for interactions based on their developed behaviors.

Synactive Theory of Development in the NICU. The Synactive Theory of Development provides an understanding of how the infant's behaviors and systems interact with each other and the environment (Als, 1982). Given the unique nature of the NICU experience, developmentally sensitive care is beneficial for the infant and parents (Als & McAnulty, 2011; Achenbach, Phares, Howell, Rauh, & Nurcombe, 1990; Chen, Zhang, & Bai, 2016; Hanson-Abromeit, 2003; Macho, 2017; Melnyk et al., 2010). This theory assists the development of this theoretical framework in outlining important factors of infant development and how the environment can affect future development.

Maslow's Hierarchy of Needs

Maslow (1954) proposed a theory of human motivation, based on the ideology that human needs must be met in a hierarchy in order to progress to a state of self-actualization. The

focus of Maslow's work on motivation was to compose a positive theory that took into account the known experimentation and facts in the psychology world, as well as Maslow's own clinical experience (Maslow, 1954). His previous work discussed several factors of motivation and human nature, several of which pertain to the idea of modifying behavior. One conclusion cites that any motivated behavior can be understood through a chain of basic needs being expressed and satisfied. A second conclusion states that needs of humans are ordered hierarchically in the sense that the attainment of the most immediate need directly impacts the achievement of future needs. The hierarchy of these needs is noted as physiological, safety, love/belongingness, esteem, and self-actualization (Maslow, 1943, 1954).

Physiological Needs. The most basic requirement for survival is the physiological stability of an individual. Homeostasis can be described as automatic processes in the body that stabilize and regulate the contents of the blood stream (Maslow, 1943, 1954). Appetite and hunger are another aspect of physiologic stability needed in order for motivation to move up the hierarchy. Homeostasis, appetite, and hunger were once seen as independent of other motivation needs, until Maslow and other researchers pointed to the need for homeostasis for appropriate brain function that allows for higher executive functions to occur (Maslow, 1943, 1954). In the NICU environment, hunger and appetite are monitored by medical staff as well as certain aspects of homeostasis and the chemical composition of the body.

However, certain stress responses from an infant that indicate need often remain unaddressed due to the complexity of the medical needs and time constraints on staff. Facilitating teaching opportunities for parents to meet these specific needs - in terms of reducing stress responses and increasing infant emotional and stress regulation skills - can aid the infant in remaining at homeostasis for a greater portion of time. Consistent interactions with caregivers,

where needs are validated and then met, assist the infant in developing emotional regulation skills. Resulting regulation capabilities impact the infant's physiological state and their later development.

Safety Needs. Once physiological needs are satisfied sufficiently and consistently, the need shifts to one of safety. Safety includes concepts such as the need for order through dependable, consistent caregiving and protection from unknown stimuli that cause a fear and anxiety response (Maslow, 1954). This need is sometimes argued as the most essential due to the all-consuming nature of the desire for safety and stability in the human mind. Safety organizes most of the higher executive functions and orders of the brain, requiring every capacity of the human throughout the process (Maslow, 1943).

Maslow also cites that certain experiences for an infant, particularly illness, can elicit a fear response that requires the safety need to be met (Maslow, 1943). This safety need is also observed in seeking a rhythm to which a routine can be established (Maslow, 1943). When an infant is in the environment of the NICU for an extended period of time, the safety need is not fully satisfied due to the complex medical needs and the necessary procedures that keep those needs met. A music intervention that encourages face-to-face interaction and interplay within a parent-infant dyad can heighten the infant's emotional regulation skills and promote a safety response that is essential for the development of a secure attachment.

Belongingness and Love Needs. When physiological and safety needs are satisfied, physiological and safety, the desire shifts towards fulfillment of the need for belongingness and love. This need develops from the recognized absence of relationships – it is, in the most basic terms, a need for affection (Maslow, 1943). Maslow (1954) cites the breakdown of belongingness with the rise of a mobile culture, claiming that families can no longer connect

with their communities because they are in a constant state of transition. The discussion shifts to the notion that cases of maladjustment and more severe diagnoses often find the lack of belongingness and love at the core of the issue (Maslow, 1954).

When in the NICU setting, parents and the infant are each in a state where they individually lack belongingness due to the unique stressors of the hospital culture. When parents and the infant do not interact with each other for long periods of time, there is no sense of belongingness formed within the family unit. This can agitate the need significantly and, without assistance, the need will continue to remain unmet. Music therapists trained with a music intervention promoting attachment would be tasked with training the parents in appropriate interactions that would increase the chances of the belongingness need achieving satisfaction.

Esteem Needs. Most humans express a desire to have a consistent, grounded concept of themselves and for others to share this same concept. According to Maslow (1943), this need can be categorized into two areas: the desire for strength and the desire for a prestigious reputation. When both of these areas are satisfied, individuals deem themselves as having an important, necessary role in the world. This can produce feelings of empowerment which assists the individual in moving up the need hierarchy, as they are seen as firmly established in their own person and community (Maslow, 1943).

One of the most difficult, anxiety-producing aspects of the NICU for parents is the idea of caring for a medically fragile infant in the home environment after discharge from the hospital. Due to perceived lack of opportunity to engage with and become acquainted with the infant, parents often find themselves feeling unprepared and unable to care for their infant (Bernstein, Spino, Lalama, Finch, Wasserman, & McCormick, 2013; Burnham, Feeley, & Sherrard, 2013; Garfield, Lee, & Kim, 2014). Evidence throughout the nursing literature

suggests that educational interventions focusing on physical, psychological, and social dynamics of caring for an infant can result in better outcomes and parents with higher self-esteem (Bernstein et al., 2013, Burnham, Feeley, & Sherrard, 2013; Chen, Zhang, & Bai, 2015; Kelly, 2006).

Higher self-esteem results in greater feelings of autonomy, which are essential for promoting a secure attachment between parents and the infant. A music intervention that involves teaching and coaching from a music therapist can encourage this self-esteem and sense of autonomy in the parents. As the intervention progresses, the music therapist is tasked with shifting the amount of interaction from therapist-infant to therapist-parent-infant to parent-infant. The supportive environment that is cultivated by the music therapist allows space for the parent to learn through trial and error, with the safety net of the therapist for consulting on appropriate interaction techniques. This triadic relationship creates a community focused on one common goal of supporting the infant's development through secure attachment between the parent-infant dyad.

Self-actualization Needs. When all other needs on the hierarchy are met, the need for self-actualization presents in humans. Self-actualization is a term originated by Kurt Goldstein that Maslow adopted to define the desire for actualization in the individual's potential (Maslow, 1954). This need focuses on the ideology that an individual is not fully satisfied and content until they are doing what they are fit to do (Maslow, 1943). Each person's need at this level of the hierarchy is highly individualized, rooted in the attainment of the other needs and their own personal desires. Due to the specific nature of this need, it can be viewed as a challenging feat to achieve by health professionals working with individuals seeking self-actualization. Maslow

(1943) indicates that there is a deficit in the literature on self-actualization due to the limited number of individuals in the world who reach that point in the hierarchy.

Self-actualization, contextualized for the purpose of this paper, includes the parent-infant dyad; self-actualization involves the infant reaching secure attachment through the knowledge that their needs will be recognized and met by the primary caregiver or parent, thus encouraging appropriate development. The infant is able to explore while maintaining a feeling of safety because the parent is perceived as a secure base from which they may deviate to explore (Duft, Stafford, & Zeanah, 2017. The NICU experience can disrupt the physical proximity necessary to the infant's development of this response (Standley, Walworth, Engel, & Hillmer, 2011) making the need for an attachment-promoting intervention evident.

The parent reaches self-actualization through achieving autonomy and self-efficacy of parenting a medically complex infant with techniques that promote a secure attachment. The NICU environment is recognized throughout the literature as one where parents require support in order to attain autonomy in caregiving (Garfield, Lee, & Kim, 2014; Haslbeck, 2012; Hutchinson, Spillett, & Cronin, 2012; Moody, Callahan, Aldrich, Gance-Cleveland, & Sables-Baus, 2017; O'Gorman, 2007; Smith, Hwang, Dukhovny, Young, & Pursley, 2013). Parents report feelings of stress due to the medical fragility and lack of interaction with the infant (Nix & Ansermet, 2009; Rinehimer, 2017; Shoemark, Hanson-Abromeit, & Stewart, 2015; Smith et al., 2013). The proposed intervention in this theoretical framework seeks to alleviate the burden of developing a secure attachment in a unique environment by providing coaching and support to the parents.

Hierarchy of Needs in the NICU. Maslow's Hierarchy of Needs (1943, 1954) can provide information on the emotions and experiences of parents with an infant in the NICU as

well as how to move the family unit through the hierarchy to self-actualization. One study found seven themes emerging from data of focus groups composed of parents with an infant in the NICU (Rinehimer, 2017). Parents cite these themes as necessary to achieving optimal interactions between themselves and the infant during the NICU stay. Theme 1 is a clear knowledge of the parents' roles and responsibilities in the NICU environment and where they fit into the caregiving team. Theme 2 suggests that parents desire clear, consistent communication between the healthcare team so that the answers provided are similar. When the answers are different, parents report increased stress and anxiety when interacting with and caring for their infant due to uncertainty of the correct path (Rinehimer, 2017).

Theme 3 focuses on the possibility that prenatally provided information on the NICU environment and care for a premature infant could benefit parents during the actual hospital stay. Due to the highly individualized nature of the NICU experience, this type of education prior to the infant's birth was deemed as potentially helpful by some and inconsequential by others who claimed, "nothing could prepare me for the NICU!" (Rinehimer, 2017, p. 93). Theme 4 is the parent's request for face-to-face education. When interventions were taught in an individualized manner, parents felt their learning was optimal. This empowered the parents in their ability to ask questions and engage in trial and error with the support of the healthcare professional directly present and focused on their family dyad (Rinehimer, 2017).

Theme 5 emphasized consistency of care for the infant and parents. Parents develop rapport with the staff that are present for the majority of the hospital stay. This rapport assists in a team-like viewpoint of the healthcare staff, parents, and the infant where the main goal of all is to sufficiently care for the infant. Theme 6, interaction with the infant, places focus on the idea that the nuances and sensitivity of parenting is lost while in the NICU environment, due to the

infant's medically complex nature. When parents are only instructed when to care for their infant and not taught how to recognize and respond to their infant's needs, attachment can be hindered and sometimes destroyed. The final theme, theme 7, focuses on the desire of parents to be heard. Parents indicated that information would be given when requested, but the information did not always appear relevant to their questions or the staff appeared unorganized due to shift changes and the vast needs of the infant being monitored (Rinehimer, 2017).

Pediatric Psychosocial Preventative Health Model

The Pediatric Psychosocial Preventative Health Model was developed in order to guide service offerings to families entering a pediatric hospitalization. The focus of the model is to account for the family as a complex unit and resilience as a process of balancing available resources and coping strategies with events that can be perceived as distressing. Social ecology is applied to the Pediatric Psychosocial Preventative Health Model, demonstrating the family within the context of the illness and hospitalization, their outside support system and community, as well as their socio-economic status, religious background, and culture. The model is divided into three different levels with the higher levels indicating families with higher levels of need (Kazak, 2006).

Universal Level. The Universal level is considered the lowest level of need, indicating that families are in a stressful situation, but maintain resilience. This level makes up a large portion of families in a pediatric hospitalization context. In terms of family dynamics, resilience typically occurs within families who have consistent emotional regulation skills and are viewed as normally functioning, with low levels of conflict (Jackson, 2017; Kazak, 2006). The family is seen as being able to cope with the current situation and maintain appropriate coping skills throughout the stressful event. Support and information can be provided to the family for a more

complete solution to the issue being addressed, as well as the family continuing to be screened for any increases in distress or need (Kazak, 2006). For a family involved in NICU hospitalization, this level equates to parents who feel efficacious when caring for their infant, who possess autonomy and appropriate caregiving techniques and are able to understand the infant's developmental strengths and needs.

Targeted Level. The Targeted level is the second highest level of need and indicates the family is in distress and risk factors are now present in the situation. This level is a smaller section of families admitted for hospitalization who are admitted with higher levels of anxiety and stress regarding the situation. An intervention should be implemented at this time to address the specific need of the family and provides alleviation of stress and anxieties. When implementing an intervention for families that demonstrate low levels of resiliency, three things should be considered: the family and environment's functionality prior to the event occurring, the family and environment's response to the event, and the nature of the event in terms of severity, how often and how long the event occurs (Jackson, 2017; Kazak, 2006). NICU hospitalization can last for an extended time period and involve complex medical issues regarding the infant. This can impact the parents' functionality when providing care for the infant and their perception of their own autonomy. Intervention administered by a music therapist should seek to address the specific needs of the parents in regards to their caregiving abilities.

Clinical/Treatment Level. The Clinical/Treatment level is the most severe need, finding families in continually increasing and consistent distress. Although this is the level at which the smallest number of families identify, the needs at this level are high and severe. There are many risk factors present, specifically psychosocial including persistent anxiety, distress, substance

abuse, and poor mental health history. Specialists should be consulted to provide the most comprehensive care due to the vast need of the family in multiple areas (Kazak, 2006). Parents in the NICU who are assessed at this level of need have little to no autonomy when caring for their infant due to the complex medical needs and environment of the NICU. The parents require intervention at the most basic level and continued support throughout the hospitalization to ensure that they are able to appropriately care for the infant.

The Pediatric Psychosocial Preventative Health Model provides a comprehensive assessment for need in healthcare settings (Kazak, 2006). This model can inform the level of need of both the parent and infant, based on the specific constructs for each within the theoretical framework. When adapted to include both parents and the infant, the psychosocial preventative health model allows for a complete picture of the family's psychosocial needs, which inform the development of secure attachment between parents and their infant in the earliest months of life.

When these models and formal theories are taken into account with the importance of developmentally sensitive care in promoting attachment relationships, a clear understanding of the need for secure attachment between parents and an infant in the NICU is present. The Hierarchy of Needs and the Transtheoretical Model of Behavioral Change provide a theoretical basis to help identify both what is required of individuals to achieve autonomy and how parent-infant dyads achieve change (Maslow, 1943, 1954; Prochaska & Velicer, 1997).

For the present, the Hierarchy of Needs provides structure in defining the different needs that must be achieved to reach autonomy (Maslow, 1943, 1954). The Transtheoretical Model of Behavioral Change can be interwoven into the Hierarchy of Needs and placed at different levels to indicate the current stage of behavior change as well as the need being achieved by parents (Maslow, 1943, 1954; Prochaska & Velicer, 1997). The Synactive Theory of Development is

combined with a hierarchy of need for the infant to better inform the intervention components that will educate the parents on developmentally sensitive caregiving for their infant (Als, 1982). Although these constructs assist in establishing a theoretical basis for the need of a music intervention, they do not explicitly state how this intervention will promote a secure attachment between the parent-infant dyad. The need for an explanation of how these variables relate to the multiple variables of the music intervention may be illustrated through causal modeling.

Causal Modeling

Social science researchers are interested in the variations among people and what causes these variations. Causal thinking focuses on explaining variability between two constructs. This explanation involves identifying variables, ascertaining relationships between the variables, and seeking to understand the causes of variability. Based on this form of thinking, causal modeling is a theoretical framework design that seeks to understand variable X and its influence on the relationship between itself and variable Y (Jaccard & Jacoby, 2010).

Determinant and outcome variables. The presumed variable of cause within the relationship is referred to as the independent or determinant variable (Jaccard & Jacoby, 2010). The presumed effect in the relationship, the dependent or outcome variable, is often the first thing identified in a causal model. This is the variable that prompts the need for explanation through a causal model (Jaccard & Jacoby, 2010).

Moderation and moderators. Moderator variables discuss the strength or manner in which this third variable functions to impact the effect of the determinant variable on the outcome variable (Jaccard & Jacoby, 2010; MacKinnon, 2011). Hypothesizing how the determinant variable will have a different effect on each individual within the model is the beginning of describing the moderators in the model (Jaccard & Jacoby, 2010). Moderators

interact with the relationship between the determinant and outcome variables but are not part of the causal process; rather, they provide rationale for the relationship between the two variables (MacKinnon, 2011).

Mediation and Mediators. Mediator variables turn direct relationships into indirect relationships by explaining why one variable (determinant) has a direct effect on the other variable (outcome), also known as the *why heuristic* (Jaccard & Jacoby, 2010). Two types of mediation occur, depending on the strength of the indirect variable on the relationship between the determinant and the outcome. Partial mediation describes a mediator that only accounts for a portion of the impact that the determinant variable has on the outcome variable, indicating that other mediating variables exist within the model (Jaccard & Jacoby, 2010). Complete mediation refers to a sole mediator that can account for the entirety of the change that the determinant variable influences on the outcome variable (Jaccard & Jacoby, 2010). Mediator variables integrally impact the ability to design an intervention that affects behavior (MacKinnon, 2011). Identifying and implementing mediators into research assists in evaluating the change process and building and refining theory construction (MacKinnon, 2011).

Mediated Moderators and Moderated Mediators. Not only can mediators and moderators have an effect on the relationship between the determinant and outcome variables, they can also affect each other. Mediated moderators and moderated mediators are two examples of the effects that these two variables can have on each other. Recognizing and identifying these relationships within the third variables of causal modeling allows for a more complete understanding of the model and phenomenon in question (Kwan & Chan, 2017). Both types of relationships will be examined in the following paragraphs, with explicit definitions of

the mediated moderators and moderated mediators presented for a comprehensive understanding of the multiple variables present within a moderated causal model.

Moderated mediation focuses on how and when an effect occurs, based on how strongly an indirect effect is on a variable (Preacher, Rucker, & Hayes, 2007). Moderated mediators occur when indirect effects or moderators, are conditional for each mediator based on whether or not the mediator is partial or complete (Jaccard & Jacoby, 2010). Mediated moderation is the combination of an indirect and moderated relationship between variables (Jaccard & Jacoby, 2010). These variables affect the success of the intervention by indirectly moderating the mediators discussed in the previous paragraph.

Theoretical synthesis.

For this theoretical framework, the researcher developed a causal model utilizing evidence from the research literature in the NICU, autonomy development, and parent-infant attachment processes. The model includes an adapted version of the Hierarchy of Needs for both the infant and parent as well as the Transtheoretical Model of Behavior Change and Synactive Theory of Development (Als, 1982; Maslow, 1943, 154; Prochaska & Velicer, 1997). A modification of the Pediatric Psychosocial Preventative Health Model is placed in between the parent and infant constructs to link their needs and define appropriate intervention strategies (Kazak, 2006). These psychological constructs assist in defining the variables and levels of complexity within the model proposed in this paper. The model is complex due to the multiple variables and their interactions with each other.

The purpose of constructing a causal model is to fully understand the elements involved in parenting an infant in the NICU and to develop a theory grounded in knowledge and literature. McGuire (2004) discusses the need to formally and explicitly define the theory from all

theoretical premises. The tendency to leave information as implicitly known can result in a theory and subsequent model containing holes of knowledge (McGuire, 2004). Although not researched and implemented within this study, the model intends to create a well-defined pathway explaining the relationship between a music intervention and a secure parent-infant attachment.

This theoretical framework utilizes aspects of formal grand theories such as the Transtheoretical Model of Behavior Change, Hierarchy of Needs, Synactive Theory of Development, and Pediatric Psychosocial Preventative Health Model to explain the patterns and relationships using causal modeling (Als, 1982; Kazak, 2006; Maslow, 1943, 1954; Prochaska & Velicer, 1997). The Transtheoretical Model of Behavior Change impacts the parent's role in the NICU hospitalization and assists in determining how the music intervention should be utilized to best support the attachment needs of the parents (Prochaska & Velicer, 1997). The Hierarchy of Needs places the infant in a position that can determine their developmental and attachment needs (Maslow, 1943, 1954).

Synactive Theory of Development indicates the infant's developmental level and, much like the constructed hierarchy of needs, informs the music-based intervention components that best support the development of a secure attachment between the parent and infant (Als, 1982). The Pediatric Psychosocial Preventative Health Model is modified to include both parent and infant needs, thereby informing the best approach for service delivery through education and intervention (Kazak, 2006). These four theoretical bases create a model outline within which other variables can be placed, thereby developing a theoretical framework that informs a causal model, which includes moderating and mediating variables in relation to the stages of these larger developmental theories.

Chapter 4
Results

The premature birth of an infant and subsequent NICU hospitalization can have significant negative impacts on the attachment relationship between parents and infants. Early connections needed for a secure attachment are more difficult for the NICU parent and infant to make due to stress from the constant adverse stimuli in the hospital and a decrease in typical parent-newborn contact due to medical fragility (Garfield, Lee, & Kim, 2014; O' Gorman, 2007; Martinez-Torteya, Rosenblum, & Marcus, 2017; Shoemark & Dearn, 2008). Thus, the NICU experience is a risk factor for insecure attachments (Goodman & Brand, 2009; Haslbeck, 2012; Moody, Callahan, Aldrich, Gance-Cleveland, & Sables-Baus, 2017; Nix & Ansermet, 2009; Shoemark, Hanson-Abromeit, & Stewart, 2015; Standley & Walworth, 2010). Attachment and early interactions between the parent and infant are essential for both survival and assisting the infant in maintaining their mental health through complex, reciprocal interactions (Rosenblum, Dayton, & Muzik, 2009; Zeanah & Smyke, 2009).

Research literature emphasizes the importance of developmental care for infants in the NICU, as well as how parents can have roles in their infant's care. There is also research suggesting music as an effective means for parent interaction with the infant that can foster a normal caregiving experience. Currently, there exists little research that explains how music interventions, based on infant development levels, can promote a secure attachment between the parent and infant while in the NICU.

This study integrates extant literature with the formal theories of Transtheoretical Model of Behavior Change, the Hierarchy of Need, and the Synactive Theory of Development in order to identify constructs that impact attachment between the parent and infant of NICU

hospitalization, including: needs of the infant, needs of the parent, and parent behavior change, (Als, 1982; Maslow, 1943, 1954; Prochaska & Velicer, 1997). Causal modeling incorporates these constructs as factors. The resulting integration and causal modeling promote a theoretical framework, identifying aspects of NICU hospitalization that could be positively impacted by a music intervention to promote parent-infant attachment. Causal modeling theory requires clear definitions of each included construct. Therefore, this chapter defines the constructs of the formal theories and the application to music therapy. The relationship between the constructs inform a theoretical framework to foster parent-infant attachment during NICU hospitalization through music therapy.

Hierarchy of Needs

The Hierarchy of Needs is a formal theory of human motivation (Maslow, 1954). Motivated behavior can be understood through a chain of basic needs being expressed and satisfied in a hierarchical order. The attainment of the preceding basic need directly impacts the achievement of future needs, thus modifying a behavior. The hierarchy of needs, from basic to advanced, is physiological, safety, love/belongingness, esteem, and self-actualization (Maslow, 1943, 1954). Maslow's Hierarchy of Needs can provide information on the emotions and experiences of parents with infants in the NICU as well as how to move the family unit through the hierarchy to self-actualization. Each level of need is addressed for both the parents and infant; however, different stages may relate more directly to the parents or infant depending on the needs of the individuals.

Physiological needs are the most basic requirement for survival. They include satisfying appetite and hunger and homeostasis. Homeostasis is the stabilization and regulation of the

autonomic nervous system, which is necessary for higher executive functions (Maslow, 1943, 1954). In the NICU environment, hunger and appetite are monitored by medical staff, as well as certain aspects of homeostasis and the chemical composition of the body. However, subtle stress responses indicating physiological need may go unaddressed due to medical complexities and time constraints on staff. Parents can be coached to support infant homeostasis by learning to respond in ways that can reduce their infant's stress responses and increase emotional regulation. Consistent interactions with caregivers validate and assist in emotional regulation, positively impacting the infant's physiological state and later development. In successfully meeting the infant's physiological needs, the parent can promote their own physiological homeostasis, making themselves more readily available to foster parent-infant attachment and address safety needs. The infant's physiological needs influence whether or not the parent's own physiological needs are satisfied. Due to the infant's complex medical condition, physiological needs can fluctuate from day to day and leave the parents' unable to cope or regulate their own biological processes from stress of an extended NICU hospitalization.

Safety needs include dependable, consistent caregiving and protection from unknown stimuli that cause a fear and anxiety response. Safety organizes the higher executive functions and orders of the brain (Maslow, 1943, 1954). Extended NICU hospitalization compromise safety needs, due to the complex and often changing medical nature of the infant. NICU hospitalization of a preterm infant is an atypical experience for both the infant and the parents. The loss of a normal birth experience is difficult for parents with infants in the NICU. Some parents even report feelings of accountability and guilt for the NICU stay (Als & McAnulty, 2011; Dellenmark-Blom & Wigert, 2014). These experiences and feelings during the NICU

hospitalization can negatively impact the parent's sense of safety, which in turn impacts the mental health of parents.

This need for a sense of safety should be addressed as early in the intervention as possible to ensure that the parents are fully prepared to begin the educational portion of the intervention. If parents are not prepared for or able to handle the education and information related to the health of their infant, the secure attachment relationship cannot be emphasized. A music intervention that encourages face-to-face interaction and interplay (i.e. responsive back-and-forth) between a parent-infant dyad can heighten the infant's emotional regulation skills. Teaching parents how to modify their level of interaction in a manner responsive to the infant's stress and self-regulatory signals can promote a safety response essential for the development of secure attachments.

When physiological and safety needs are satisfied, the need for belongingness and love emerges from the recognized absence of relationships (Maslow, 1943). The breakdown of belongingness is rooted in families who can no longer connect with their communities because they are in a constant state of transition (Maslow, 1954). The unfamiliarity of the NICU environment and medical uncertainties can place the parents and infant in a constant state of transition that can interfere with their ability to interact over long periods of time. Therefore, the sense of family belongingness can be significantly agitated; without assistance the need will remain unmet. A music intervention that promotes appropriate interaction. while concurrently recognizing the potentially tenuous nature of infant medical stability. increases the sense of belongingness and love, thus promoting attachment.

Esteem needs can be categorized into two areas: the desire for strength and the desire for a prestigious reputation. When both of these areas are satisfied, individuals deem themselves as

having an important, necessary role in the world. This esteem can produce feelings of empowerment, which assists the individual in moving up the need hierarchy, as they are seen as firmly established in their own person and community (Maslow, 1943, 1954). Due to perceived lack of opportunity to engage with and become acquainted with the infant, parents often find themselves feeling unprepared and unable to care for their infants. Educational interventions focusing on physical, psychological, and social dynamics of caring for an infant can result in better infant outcomes and parents with higher self-esteem (Bernstein, Spino, Lalama, Finch, Wasserman, & McCormick, 2013; Burnham, Feeley, & Sherrard, 2013; Chen, Zhang, & Bai, 2015; Garfield, Lee, & Kim, 2014; Kelly, 2006). Higher self-esteem results in greater feelings of autonomy, which become essential for promoting a secure attachment between parents and infants. A music intervention that involves teaching and coaching can encourage a sense of autonomy in the parents. As a sense of parent efficacy grows, the parents can shift the interaction from therapist-infant to therapist-parent-infant to parent-infant. This supportive environment is cultivated by allowing space for the parent to learn through trial and error, with consultative reassurance from the therapist.

Self-actualization occurs when all other needs on the hierarchy have been met. It is the individual's desire to identify and fulfill their true potential (Maslow, 1943, 1954). Self-actualization is highly individualized and can be challenging for health professionals to foster. Self-actualization can be recognized in the infant who feels safe exploring away from their parent. This behavior is a hallmark of secure attachment, which is formed by the primary caregiver or parent consistently recognizing and meeting the needs of the infant (Duft, Stafford, & Zeanah, 2017). Parental autonomy and self-efficacy with their medically complex infant promotes self-actualization, thus a secure attachment. However, the NICU experience can make

it difficult for a parent to be consistent in recognizing and meeting their infant's needs due to the disruption of physical proximity necessary for parent-infant interaction. This can create parental stress, making the need for an attachment-promoting intervention evident (Nix & Ansermet, 2009; Rinehimer, 2017; Shoemark, Hanson-Abromeit, & Stewart, 2015; Smith et al., 2013; Standley, Walworth, Engel, & Hillmer, 2011). Parents require support in order to attain autonomy in caregiving within the NICU environment (Garfield, Lee, & Kim, 2014; Haslbeck, 2012; Hutchinson, Spillett, & Cronin, 2012; Moody, Callahan, Aldrich, Gance-Cleveland, & Sables-Baus, 2017; O'Gorman, 2007; Smith, Hwang, Dukhovny, Young, & Pursley, 2013); therefore, music intervention should provide supportive opportunities for positive and independent interaction.

Transtheoretical Model of Behavior Change

The Transtheoretical Model of Behavioral Change identifies stages and processes of change in health behaviors over time. This model is based on a comprehensive integration of psychotherapy theories and interventions. Stages of change, identified as precontemplation, contemplation, preparation, action, maintenance and termination, sets up change as a sequential process and not a singular event. Processes of change, either individual or organizational, consist of facilitating these stages of change and are embedded within the stages of change to help facilitate and guide the shift in behavior (Prochaska & Velicer, 1997). Processes of change include consciousness raising, dramatic relief, environmental reevaluation self-evaluation, self-liberation, social liberation, stimulus control, counterconditioning, and contingency management. Processes of change are divided into two areas of change, individual and organizational. Individual processes alter thoughts and actions associated with the behavior. Often, these processes are implemented under the guidance of a health professional in order to promote the

most effective, seamless transition from the unhealthy behavior and lifestyle to the healthy version. Organizational processes share many of the same components as individual processes. The purpose of the organizational level is to encourage the use of the individual processes. Organizational processes are the point in behavior modification treatment where the health professional becomes a support and the individual becomes the guide in the process of change (Levesque, 2001).

Precontemplation. Individuals in the precontemplation stage are not seeking to change their behavior or actions. This is possibly due to the fact that they do not understand the consequences of their behavior or the idea of changing is deemed unachievable due to past experience or perceived workload (Prochaska & Velicer, 1997). NICU parents at this stage may be unaware of how their behaviors and/or the infant's experience may affect the attachment process. The stress of the experience combined with limited knowledge on preterm infants can inhibit parents from understanding the attachment needs of their infant. In this stage, parents may not feel adequately prepared to care for their infant in a way that facilitates attachment (Benitz & Committee on Fetus and Newborn, 2015; Bernstein, Spino, Lalama, Finch, Wasserman, & McCormick, 2013; Dellenmark-Blom & Wigert, 2014). Music interventions can promote and illustrate attachment processes through developmentally and environmentally appropriate music experiences. These interventions can increase parent knowledge and foster recognition of infant behaviors in response to music stimuli. The music therapist can provide direct services to the infant, communicating intervention processes and infant responses to the intervention in a manner accessible to the parents, in turn promoting greater awareness.

Consciousness Raising. Consciousness raising is a process of change that seeks to make the individual(s) aware of how their behavior is affecting the environment and situation. After

this initial understanding occurs, the next step is to assist them in understanding behavior modification necessary to achieve ideal outcomes. Parents in the NICU are subject to a uniquely stressful and challenging environment that negatively impacts the ability to attach to their infant (Favez, Frascarolo, Keren, & Fivaz-Despeursinge, 2009; Nix & Ansermet, 2009). An assessment to determine if a music intervention is appropriate to facilitate the attachment process can be a form of individualized consciousness raising. Organizational consciousness raising could focus on a parental choice component of how the intervention is set up in order to best meet the needs of the family unit.

Contemplation. The second stage defines the point at which people intend to make the change. There is a balance of understanding what is present at this stage about the pros and cons of altering the behavior. Because of the knowledge gained in precontemplation, individuals can remain in this stage for long periods of time (Prochaska & Velicer, 1997). For parents in the NICU, this stage directly relates to the period in time where education and teaching on the infant begins, yet there is still a considerable amount of fear and self-doubt from the parent about being able to care for the infant without the support of the treatment team (Chen, Zhang, & Bai, 2016; Moody, Callahan, Aldrich, Gance-Cleveland, & Sables-Baus, 2017). For music therapists, this is an opportune time to begin implementation of an intervention to promote self-efficacy in the parents. Music intervention will be introduced at this time with the therapist modeling the intervention for the parents. Extensive support from the music therapist during the intervention is crucial in order for parents to increase self-efficacy and autonomy in caring for their infant. The music therapist will be responsible for the implementation of the intervention, encouraging parents' participation through modeling, resources, availability for questions and providing

information or clarification. The contemplation stage of change is supported through processes of change of dramatic relief, environmental reevaluation, and self-reevaluation.

Dramatic relief. Dramatic relief techniques, such as allowance for grief and personal testimonies, can assist the parents in the healing process and identification of the pros and cons to shifting or maintaining their current behaviors. The music therapist can utilize dramatic relief processes to work through those feelings and emotions associated with the experience of NICU hospitalization. The music therapist is building rapport with the parents and supports their solid identification as a member of the treatment team. The support that the music therapist offers is tantamount to the development of autonomy in the parents. When building rapport with parents, a period of discussion about the NICU experience and the parents' emotions and circumstances can help to inform the music therapist of how best to facilitate the intervention (Garfield, Lee, & Kim, 2014; Hutchison, Spillett, & Cronin, 2012; Nix & Ansermet, 2009). This time will also provide more information about the family and valuable insight into their musical preferences, cultural background, and life experiences, all of which should be taken into consideration during intervention implementation (Hanson-Abromeit, 2003; Shoemark & Dearn, 2008).

Environmental reevaluation. Environmental reevaluation is a process of change that focuses on how the potential behavioral change will impact the individual's environment (Prochaska & Velicer, 1997). Differing from dramatic relief, environmental reevaluation takes into account the environment, as well as the individuals in the environment and the impact of behavior change on these components. This technique poses a unique opportunity for the music therapist to hypothesize with the parents about how increased involvement in their infant's cares will promote improved health outcomes for both parties, as well as a secure attachment between the parents and infant (Broedsgaard & Wagner, 2005; Chick & Meleis, 1986; Melnyk, Feinstein,

Alpert-Gillis, Fairbanks, Hugh, & Sinkin, 2006). The parents' attachment history can also be further discussed, particularly in regard to how it can promote or inhibit the development of a secure attachment. During this process, the music therapist provides resources and support for helping parents to understand the imperative nature of secure attachments on future development.

Self-reevaluation. Like environmental reevaluation, self-reevaluation focuses on understanding what effects will occur because of the behavior change. Self-reevaluation is the awareness of how the behavior change will affect the individual and their self-perception. This impact is felt both cognitively and affectively by the individual. All types of impact must be accounted for to determine whether modification of the behavior is appropriate (Prochaska & Velicer, 1997). Parents of preterm infants can experience difficulties with autonomy and self-efficacy due to the uniquely stressful and challenging nature of NICU hospitalization (Garfield, Lee, & Kim, 2014; Nix & Ansermet, 2009). Autonomy is achieved through the parents' self-perceived capacity to provide care for their infant as an active, integral member of the caregiving team, with the understanding that the end goal is for the parents to assume full caregiving responsibilities (Lindberg, Fagerström, Sivberg, & Willman, 2014). The music therapist should outline how the music intervention can promote this attachment and a sense of parental ownership in the intervention by seeking input from the parents and ensuring that their emotional needs are also addressed (Abad & Edwards, 2004; de l'Etoile, 2015; Edwards, 2011; Haslbeck, 2012; Shoemark & Dearn, 2008; Shoemark, 2013).

Preparation. The preparation stage is when individuals decide that action will be taken in the near future to assist in the behavior change (Prochaska & Velicer, 1997). In the NICU, this is when parents will begin to learn more about the processes involved in the intervention and

how to appropriately interact with and read the cues of their infant, taking a more active role through parent-initiated interactions (O'Gorman, 2007; Rinehimer, 2017; Shoemark, Hanson-Abromeit, & Stewart, 2015). The music therapist will still facilitate the intervention fully but will begin to explain the components of the intervention so that the parents have a clear understanding of the infant's needs and how to address them. This is the time where building a relationship between the parent and music therapist grounded in trust and understanding becomes essential to effectiveness of the intervention. A sense of trust may result in more willingness to share feelings and experiences with the therapist. The music therapist should foster a warm, nurturing environment to ensure parents feel supported in their efforts. Some feelings and experiences may be deemed socially unacceptable to discuss and parents may perceive such discussions should not occur, even with a trained professional. Thus trust is essential between the therapist and parent dyad (Kurth, Spichiger, Stutz, Biedermann, Hosli, & Kennedy, 2010).

Self-liberation. Self-liberation is a process of change that combines believing behavior change can occur and commitment to change the behavior (Prochaska & Velicer, 1997). For parents in the NICU, autonomy and empowerment are essential to the development of attachment in such a unique setting (Hanson-Abromeit, 2003; Nix & Ansermet, 2009). When given the opportunity to observe and learn from the music therapist, parents are able to promote attachment with their infants through musical interactions that promote the subtle and inherently musical characteristics of communication (Abad & Edwards, 2004; Conrad, 2010; Shoemark, 2013; Thompson, 2012; Trondalen, 2016). As parents develop a greater understanding of their infant's cues, their role will transition to be main facilitators of the intervention while the music therapist provides support and encouragement as necessary.

Social liberation. Social liberation as a process of change, places a large focus on advocating for the individual to feel confident because of the behavior change (Prochaska & Velicer, 1997). This occurs through providing multiple opportunities for the behavior change to happen. In the context of NICU music intervention, social liberation occurs when the music therapist begins to separate from the parents and allow them to lead the intervention. This level of separation is essential to developing autonomy; how the music therapist fosters this transition over time is important to consider in the context of the intervention (Franklin-Hall, 2013; Hanson-Abromeit, 2003; Lindberg, Fagerström, Sivberg, & Willman, 2014; Nix & Ansermet, 2009; Trondalen, 2016). The separation will occur when the music therapist has adequately demonstrated how to modulate the infant's cues through meaningful, attuned interactions., The amount of opportunities for these types of synchronized interactions increase as the parents move to fully engaging with the infant, which in turn, promotes secure attachments (Als & McAnulty, 2011; Trondalen, 2016; Zeanah & Smyke, 2009).

Action. Action is the most observable stage of change in the behavior treatment. Specific modification for the behavior is made based in a treatment model that sufficiently alters the behavior (Prochaska & Velicer, 1997). When parents in the NICU enter this stage of behavior change, they begin to implement the intervention alongside the music therapist. This is where rapport in the relationship will continue to be built along with parental empowerment and autonomy. Empowerment is defined in this context as intrinsic motivation, based in personal and interpersonal power, that promotes individuals, families or communities to improve their circumstances through actions (Holcomb-McCoy & Bryan, 2010). Parents must have an intrinsic motivation to provide effective interactions supportive to their infant's development, meets their infant's needs, and promotes a secure attachment between the infant and parents (Holcomb-

McCoy & Bryan, 2010). This motivation has been shown to increase with music intervention and music therapy services (Haslbeck, 2012; Haslbeck, 2013). As parents demonstrate increasing competency with the intervention, the music therapist will begin to shift the role of interventionist from the therapist to the parent, with the music therapist being secondary in the treatment to the parents, then eventually allowing the parents to fully implement the intervention.

Maintenance. The maintenance stage of change focuses on the point in treatment where the individual still actively works to prevent a regression back to the original behavior, but the change processes occur less frequently than in action stage. At this point, the confidence of the individual in their ability to alter this aspect of their life long-term increases because of success over time (Prochaska & Velicer, 1997). Parents are solely responsible for implementing the intervention at this stage, with the music therapist present for support and encouragement to continue the development of autonomy and empowerment in the parents.

Counterconditioning. Counterconditioning, as a process of change, focuses on substituting previous behaviors with more appropriate, functional alternatives in order to strengthen the effect of the behavior change (Prochaska & Velicer, 1997). There is a focus on promoting interactions between the parent and infant where the parent learns to care for the infant while still receiving support from the medical staff. The music therapist, in the context of a music intervention, can prompt behavior alternatives through the intervention components. When parents are fully responsible for the intervention and ensuring that their reactions to the infant's needs are congruent with facilitating a secure attachment, the music therapist removes behavior prompts.

Stimulus Control. Stimulus control prompts positive behavior alternatives that will eventually remove cues for the original behavior (Prochaska & Velicer, 1997). The main

objective is encouraging a change that reduces possible return to the original behavior. For the music intervention, stimulus control reinforces parental behaviors that support attachment through synchronized, purposeful interactions, while simultaneously educating and coaching the parents with new techniques to strengthen the secure attachment. The intervention may have levels where the music therapist shifts from the education and coaching role to support and allowing the parents to educate the staff on the infant.

Termination. Termination is the final stage of change. It presents an individual with full autonomy to choose the appropriately changed behavior over the previous at any point in time, regardless of emotion or circumstance (Prochaska & Velicer, 1997). Parents of infants in the NICU consistently demonstrate effective attachment-promoting behaviors at this time, leading the music therapist to begin service termination. This termination process requires explicit communication between the parents and music therapist with the understanding that their treatment is complete because of their success in cultivating autonomy. This stage should also emphasize that parenting can be a community effort and that it is not the sole responsibility of the parent to meet every need of the infant; rather, the support system is teaching the infant, through interactions, how to successfully self-regulate (Conrad, 2010).

Contingency Management. The process of contingency management involves setting up consequences for steps in the direction of either recovery or relapse. These consequences can be positive or negative in nature and should seek to encourage the change to a positive behavior (Prochaska & Velicer, 1997). At greater levels of autonomy, the parent will implement the music intervention and the consequence is the infant's regulated and positive response to the parent based on interactions to promote attachment. The intrinsic reward of self-efficacy and autonomy in caring for a medically complex infant paired with the extrinsic reward of support from the

parent's community act as a motivator to ensure that the behavior is maintained and continued after the intervention is complete.

Parent Constructs of Need

Figure 1 represents an integration of the hierarchy of needs and transtheoretical model of behavior change for parents with an infant the NICU. The pyramid is colored based on the severity of the need, with darker colors indicating the more complex needs of the parents. The darkest section, at the Physiological Needs level, indicates a high need for extensive amounts of education and teaching about the infant to promote autonomy for improved parent perception and ability to care for a medically fragile infant. This need may be even greater if there are indicators of poor parent mental health and issues in parent attachment history. The progressively lighter sections, the levels of Safety, Belongingness and Love, and Esteem Needs, indicate targeted intervention for parents that are assessed as having some mental health concerns, attachment history concerns and a moderate need for education and teaching about the infant to promote autonomy in order to improve their perception of their ability to adequately care for their infant.

The lightest section of the pyramid, at the Self-Actualization Needs level, showcases the parents as requiring only basic support and information about their infant in order to feel autonomous in their abilities to care for the infant during and after the hospitalization. These parents are assessed as having resilience, with limited mental health concerns or attachment history needs, and desiring standard support and information from the music therapist. The parents are still monitored, if needs should arise, but are able to move through the distressing aspects of NICU hospitalization without formal intervention and treatment.

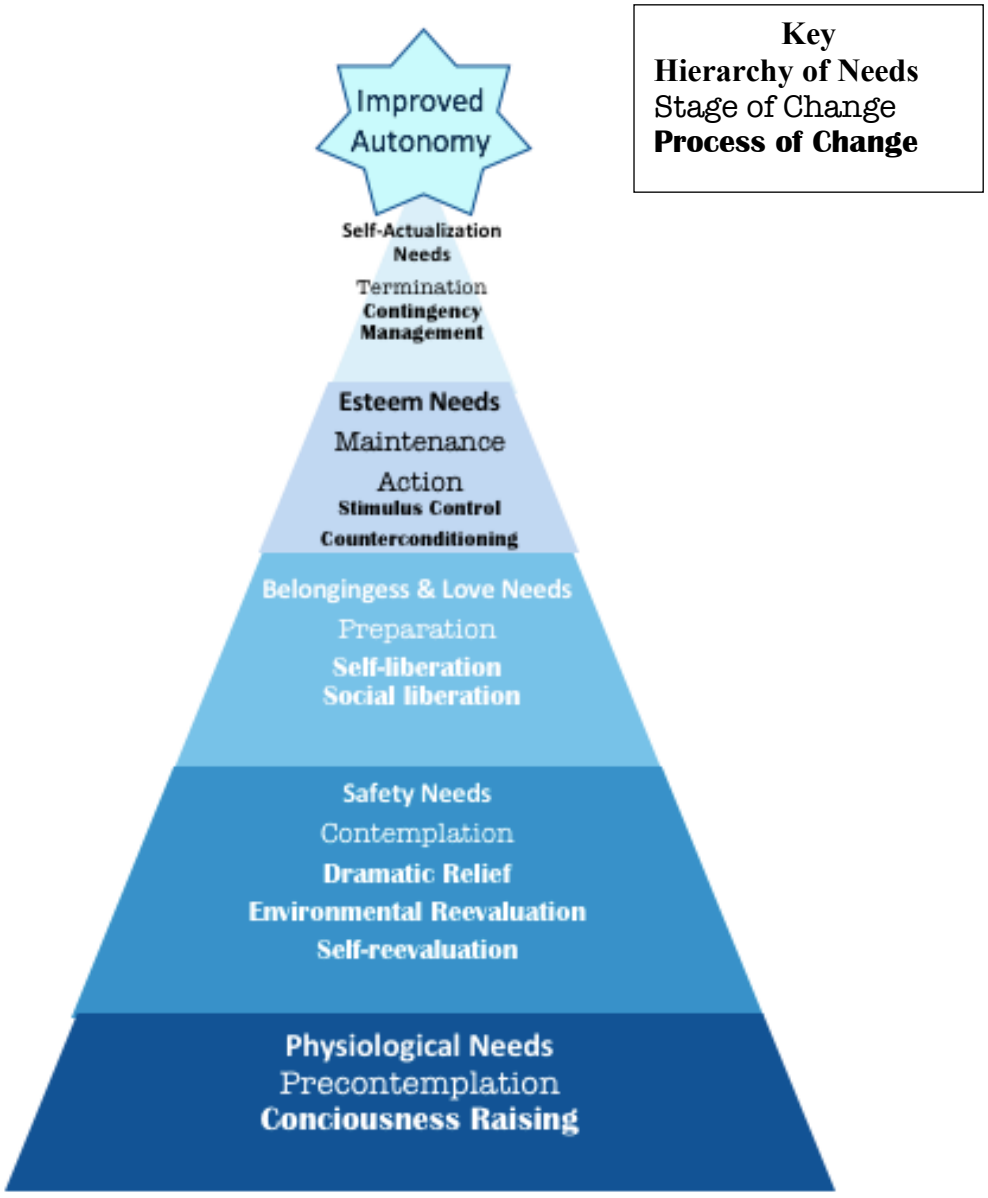

Figure 1: Hierarchy of Needs & Behavioral Change for Parents in the NICU

Synactive Theory of Development

The Synactive Theory of Development identifies gestational age dependent developmental subsystems - autonomic, motor, behavior state, interaction/attentional – that are influenced by constant sensory input from the fetal and external environment. The subsystems are reciprocal and earlier developing subsystsems (e.g. autonomonic) influence the development and integration of later developing subsystems (e.g. the ability to attend and interact with the environment and sensory input). Term newborn infants possess the ability to quickly regulate the majority of their systems; however, due to their inexperience in the extrauterine environment newborn infants can experience challenges regulating their attentional-interactive system if the amount and intensity of the stimuli is too complex. Premature birth interrupts the development of the subsystems creating challenges for the premature infant ability to manage and interact with sensory experiences (Als, 1982).

Given the unique nature of the NICU experience compared to the ideal environment of the womb, developmentally sensitive care is essential for the premature or medically complex infant and parents (Als & McAnulty, 2011; Achenbach, Phares, Howell, Rauh, & Nurcombe, 1990; Chen, Zhang, & Bai, 2016; Hanson-Abromeit, 2003; Macho, 2017; Melnyk et al., 2010). The Synactive Theory of Development outlines important factors of infant development and how the environment can affect future development. Considerations for the gestational age of the premature infant and the developmental trajectory of the infant subsystems, paired with the infant hierarchy of needs can be supportive to attachment-based parent music interventions. Figure 2 illustrates how these constructs fit together.

Physiological needs. The physiological needs of infants are continually monitored in the NICU. The medical staff in the NICU intervene to ensure the infant maintains homeostasis across a variety of needs such as hunger, appetite, and vital signs (O'Gorman, 2007; Purdy, Singh, Le, Bell, Whiteside, & Collins, 2012; Shoemark, 2013). Although medical procedures and monitoring are necessary to maintain infant health, stress responses of the infant are often not addressed due to inability of the staff to provide complete developmental care to every patient (O'Gorman, 2007; Shoemark, 2013; Smith, Dukhovny, Zupanic, Gates, & Pursley, 2012). Music therapy programming that promotes parent responsive caregiving provides the infant with comprehensive, developmentally-centered care throughout their NICU hospitalization.

Primary Concerns for Physiological Needs determined by gestational age. Physiological needs are most evident from 21 to 27 weeks gestational age. With survival outside of the womb most probable at approximately 24 weeks, there are certain developmental milestones and behaviors that should be noted to inform how best to facilitate the infant's subsequent development. At 24 weeks, the infant exhibits only one behavioral state not classified as either alert or asleep. Rapid eye movements are one of the infant's main behaviors, due to their underdeveloped nature and exposure to extrauterine stimuli (Als, 1982; DiPietro, Hodgson, Costigan, & Hilton, 1996; Holst et al., 2005; Medline Plus, 2018). At 25 to 27 weeks gestational age the infant demonstrates respiratory movements, but the lungs and respiratory system are still underdeveloped and typically require medical intervention to ensure stability and reduce the likelihood of permanent lung damage (Hanson-Abromeit, 2003; Medline Plus, 2018; Standley & Walworth, 2010). Sensory stimulation, especially a multi-sensory stimulus such as music, should be carefully monitored during this early period, with literature recommending that music

intervention be introduced around 28 weeks gestational age when infants possess a more developed auditory system (Hanson-Abromeit, 2003; Standley, 2002).

Autonomic system. As the first system developed in the human infant, the autonomic system ensures stabilization of functions as stimuli is processed by the infants and assists the infant in returning to homeostasis (Als, 1982). The full-term infant can typically regain stability of this system quickly after birth; however, preterm infants are at risk due an underdeveloped autonomic system unable to function in the extrauterine world (Als, 1982). When observing infants for any autonomic signs of overstimulation, drastic vital sign changes, hiccoughing, and changes in color among other stress behaviors indicate a need to lessen the sensory stimulation occurring during the intervention (Als, 1982; Als & McAnulty, 2011; Hanson-Abromeit, 2003; Standley & Walworth, 2010). If any of these markers are observed, the music intervention should lessen in intensity to decrease as much as possible any chance of adverse effects.

Motor system. The infant's motor system controls its movements, postures, and tone. Motor system functions become easy for the full-term infant to control once they are used to the extrauterine environment, typically within a few hours. Their movements become smoother and their posture varies with more flexing and extension. In a preterm infant, this system is underdeveloped and reliant on the autonomic system, which is also not functioning at capacity due to immaturity. When the motor system experiences this loss of support, it attempts to function on its own; this premature independence can negatively impact future development of sensory organization (Als, 1982). Due to the premature infant's underdeveloped motor system, control over their movements, postures, and tone can be adversely affected and require careful monitoring to decrease any long-term developmental impacts. The motor system relies on the underdeveloped autonomic system for stabilization and feedback from sensory stimulation. The

music intervention should look for signs of overstimulation such as hyperextension of limbs, fingersplays, and squirming as well as facial grimacing to determine whether to continue at the same or decreased intensity of sensory stimulation (Als, 1982; Hanson-Abromeit, 2003; Nix & Ansermet, 2009).

Safety needs. When an infant is subject to an abnormal experience such as NICU hospitalization, the need for safety is manifested by the infant seeking structure and relief from continually alerted fear responses (Maslow, 1943; Sheridan & Nelson, 2009). The focus of NICU care to stabilize the physiological needs of the infant often leaves the safety needs unmet and the fear responses activated for prolonged periods of time, which can have a negative impact of neurobehavioral development (Hanson-Abromeit, 2003; Sheridan & Nelson, 2009). Music intervention at the safety level should seek to provide the infant with interactions involving meaningful interplay and synchronization.

Primary Concerns for Safety Needs determined by gestational age. Focusing on safety needs is most appropriate when the infant is 28 to 36-weeks gestational age. The infant's systems, such as the auditory and neurobehavioral systems, are still developing at this stage, and will require intervention to ensure appropriate development (Als, 1982; DiPietro, Hodgson, Costigan, & Hilton, 1996; Hanson-Abromeit, 2003; Holst et al., 2005). The infant also better organizes stimuli and can begin to signal a desire for interaction from others (Duft, Stafford, & Zeanah, 2017; Rosenblum, Dayton, & Muzik, 2009; Samerhoff, 1978). Ideally, the music therapist begins the interactions, while encouraging the parents to observe, educating them on appropriate interaction techniques to facilitate secure attachment and meet the infant's needs and desires for interaction.

State system. The state of the infant informs their availability and desire for interaction with others. Infant states are defined by periods of alertness or sleep and determine the infant's availability for sensory input (Als & McAnulty, 2011; Hanson-Abromeit, 2003; Shoemark, 2013). Full-term infants are usually able to manage these states and flow seamlessly between them, although caregiver involvement during those transitions is still ideal for teaching the infant efficient movement between the cycles. Preterm infants experience difficulty modulating between cycles due to the underdeveloped autonomic and motor subsystems that the state system relies on for feedback of sensory stimuli (Als, 1982). The modulation between the different states of alertness should be carefully monitored in the music intervention and interactions should not be attempted if the infant is not in a quiet alert state, which can signal availability for communication.

Belongingness and love needs. The belongingness and love need manifests itself in the need for affection from other humans (Maslow, 1943). For infants, affection and interaction from others during the first year of life is imperative for ideal development and the formation of a secure attachment to their caregivers, typically the parents (Martinez-Torteya, Rosenblum, & Marcus, 2017; Rosenblum, Dayton, & Muzik, 2009; Zeanah & Smyke, 2009). A preterm infant's NICU hospitalization can sever the belongingness in a family unit due to long periods of limited interaction between the parents and infants. The music intervention seeks to provide an increase in opportunities for interactions between parents and infants that are meaningful.

Primary Concerns for Belongingness and Love Needs determined by gestational age. Belongingness and love can emerge as a focus for the 37 to 41 weeks gestational age infant. This is a point of fetal development when the infant is able to survive in the extrauterine world without medical intervention if no complications arise. An increase in stimuli intensity, as well

as duration, is appropriate at this time due to the infant's more developed and advanced systems (Graven & Browne, 2008; Holst et al., 2005; Oppenheim & Koren-Karie, 2009). All systems are interacting with each other and the environment in order to inform the infant's behaviors and signals. The awake-alert state period is ideal for interactions between parents and infants. The infant is better prepared to participate in increased reciprocal communication and positive interactions with caregivers (Graven & Browne, 2008; Oppenheim & Koren-Karie, 2009; Rosenblum, Dayton, & Muzik, 2009). However, extra precautions and adaptations must be made in order to understand the preterm infant's cues and recognize when interaction is appropriate (Als, 1982).

Esteem needs. The esteem need for infants focuses on whether or not they feel that their needs are being adequately met by their caregivers. When infants signal their caregivers, the goal is to make the response to the need a primary concern and not solely a symptom to be managed. For an infant, their cues for interaction are their primary communication method and should be treated as a serious request (Shoemark, 2013). Within the esteem need, the attentional/interactive system is still being considered and fostered through the interactions with the parents. These interactions can be optimized through the music intervention.

Primary Concerns for Esteem Needs determined by gestational age. From 42-46 weeks gestational age, infants begin to possess the ability to reciprocally engage in social interactions with others (Als, 1982). This engagement is different than that of a preterm infant, whose behaviors during interactions can include less responsiveness and alertness, with the potential for increased irritability and gaze aversion to indicate overstimulation (Smith, Hwang, Dukhovny, Young, & Pursley, 2013). At this stage of development, infants are becoming more inherently social; they are responding to reciprocal interactions with smiling, sustained eye contact, and

cooing as well as demonstrating their ability to differentiate between human expressions (Rosenblum, Dayton, & Muzik, 2009; Standley & Walworth, 2010; Zeanah & Smyke, 2009). The music therapist should educate the parents on infant cues in the moment, as well as how to respond to those cues to best meet the infant's needs (Moody, Callahan, Aldrich, Gance-Cleveland, & Sables-Baus, 2017; O'Gorman, 2007; Shoemark, Hanson-Abromeit, & Stewart, 2015). This period elicits the most response from the infants towards the parents which can provide motivation and reinforcement for the parents when interacting with their infants. The music therapist should seek to maximize these opportunities for interaction, as well as emphasize the infant's responses to the parents' socializations.

Self-actualization needs. At this point in infant development, the infant recognizes that their needs will consistently be met by their caregivers. The infant utilizes their interaction capabilities to signal their caregivers when they desire interaction with the expectation that the caregiver will provide for them, based on previous experiences (Zeanah & Smyke, 2009). Music intervention can assist in maintaining the development of the attentional/interactive system to ensure that self-actualization is achieved, while also increasing the amount of interactions between parents and the infant thus encouraging the infant's development (Abad & Edwards, 2004).

Primary Concerns for Self-Actualization Needs determined by gestational age. From 47 weeks gestational age and forward, infants are engaging in reciprocal interactions occasionally signaling their availability for object play within the interactions. Due to functional eyesight and tracking abilities, the infant can focus on brightly colored and contrasting objects held approximately 10-12 inches from their face (Holst et al., 2005; Medline Plus, 2018; Samerhoff, 1978; Shoemark, 2013; Standley & Walworth, 2010). The increased ability to handle more

complex, intense stimulus for longer periods of time is when the music therapist should seek to transition from leading the intervention to providing support and encouragement to the parents, who are encouraged to become the facilitators of the intervention at this point.

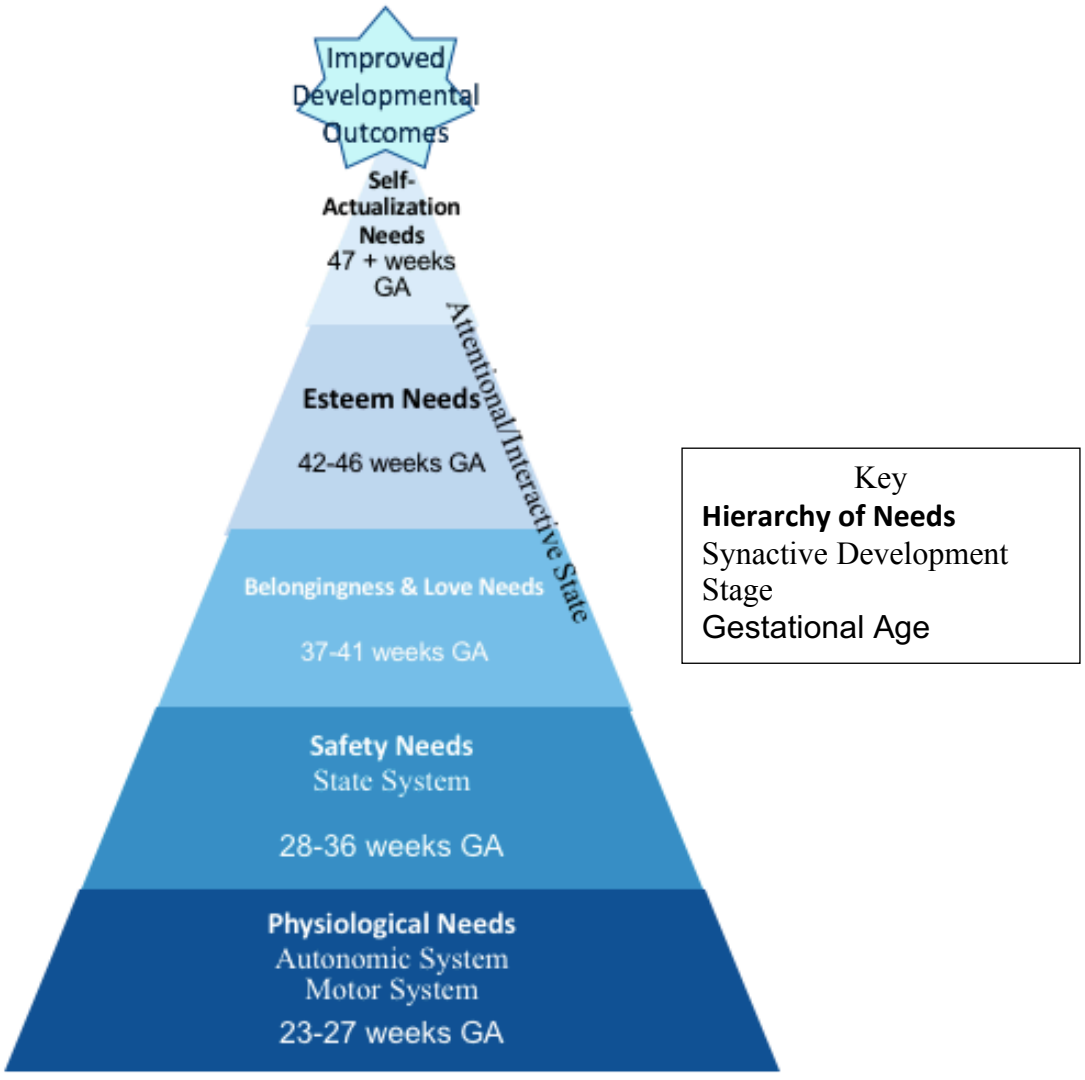

Figure 2: Hierarchy of Need & Synactive Development for Infants in the NICU

Parent and Infant Psychosocial Preventative Health Model.

The Pediatric Psychosocial Preventative Health model identifies levels of intervention based on risk factors of the hospitalized child and family (Kazak, 2006). This model was modified for music therapy to encompass the level of intervention recommended based on parent and infant positions on their independent hierarchies. The modified model includes three levels of support for families as recommended by Kazak (2006), but also accounts for parent mental health, parent attachment history, need for education and teaching about their infant and the infant's developmental level, environment, and behaviors during their NICU hospitalization. At each level of support, the color reflects the severity of the need, with the darker colors indicating a higher need for both parents and infant while lighter colors indicate a lower need and higher levels of autonomy for parents and on-target development for infants.

Several themes and constructs must be considered at each level of intervention on the parent and infant psychosocial preventative health model to determine parents' availability for intervention. Parents of infants in the NICU identified seven themes necessary to achieve optimal interactions between themselves and the infant during the NICU stay: clear knowledge of roles and responsibilities; clear, consistent communication; option for prenatal education regarding preterm infants; face-to-face education; consistency of care for benefit of parents and infant; opportunities for parent interactions with infant; and ensuring parents are integral members of the treatment team (Rinehimer, 2017). These themes can inform parents' availability for the intervention fostering attachment.

Theme one states parents desire clear knowledge of their roles and responsibilities in the NICU environment and where they fit into the caregiving team. Theme two showcases the desire for clear, consistent communication between the healthcare team to provide similar answers to

parents as different responses to their questions and concerns increase stress and anxiety when interacting with and caring for their infant due to uncertainty of the correct path (Rinehimer, 2017). To identify clear roles of the therapist and parent and explicit communication about music intervention at each level of intervention in the NICU, knowledge of parents' attachment and mental health history can provide understanding of the parents' psychosocial needs prior to NICU admission.

Parent attachment history affects the attachment classification and quality of attachment developed between the parent and infant (Hesse, 2008). Attachment history can also inform the parents' mental health and provide the music therapist with a more complete picture of the parents' needs and what components of the intervention should first be utilized to reconstruct the parents' own attachment, so that a secure attachment between the parents' and infant can be established. The mental health of the parent plays an important role in the NICU experience. Likelihood of increased stress as a result of NICU hospitalization creates barriers the parent must overcome to be able to care for and build attachment with the infant (Nix & Ansermet, 2009; Rosenblum, Dayton, & Muzik, 2009; Smith, Hwang, Dukhovny, Young, & Pursley, 2013). Diagnoses such as post-partum depression, post-traumatic stress disorder, anxiety, stress, and depression alter the attachment quality because the interactions between the parent and infant lack responsiveness and intimacy (Goodman & Brand, 2009).

Music interventions must account for parent attachment history and mental health prior to hospitalization paired with the effects of increased stress, ability to navigate direct caregiving, and how quality of responsiveness and intimacy in parent mental health during hospitalization can negatively impact attachment in order to best inform the intervention delivery and account for the needs of the parent. If any concerns are present, the music intervention should modify the

parent and therapist roles, as well as style of communication. The parents' experience in the NICU is also important, as it informs the availability of the parents' to understand and integrate new information that will enhance their interactions with their infant to promote a secure attachment.

Theme three is a desire for education about the NICU prior to the infants birth. Due to the highly individualized nature of the NICU experience, pre-birth was deemed as potentially helpful by some and inconsequential by others who claimed, "nothing could prepare me for the NICU!" (Rinehimer, 2017, p. 93). In Theme four, parents request face-to-face education. When interventions are taught in an individualized manner, parents feel their learning is optimal. This empowers parents in their ability to ask questions and engage in trial and error with the support of the healthcare professional directly present and focused on their family dyad (Rinehimer, 2017).

Research suggests that parents deem the amount of education and teaching they receive in the NICU as imperative in feeling confidence when caring for their infant (Bernstein, Spino, Lalama, Finch, Wasserman, & McCormick, 2013; Kelly, 2006; O'Gorman, 2007; Smith, Hwang, Dukhovny, Young, & Pursley, 2013; Smith, Dukhovny, Zupancic, Gates, & Pursley, 2012; Walker, Watters, Nadon, Graham, & Niday, 1999). Parenting is a learning process, regardless of the medical condition of the infant; however, specific learning and knowledge is necessary when an infant is preterm and experiences NICU hospitalization. Education and teaching in the hospital can provide parents with a support system that encourages their own development of autonomy and self-efficacy while gaining the skills necessary to securely attach to and provide cares for their infant (Askelsdottir, Lam-de Jonge, Edman, & Wiklund, 2013). Therefore, face-

to-face quality education and teaching individualized to the parent needs during the NICU hospitalization is essential when implementing the music intervention.

The parents' perception of education quality while in the NICU is important in their feelings of readiness to effectively interact with and care for their infant (Bernstein, Spino, Lalama, Finch, Wasserman, & McCormick, 2013). Quality parent training within a music therapy intervention should include opportunities for the parents to appropriately meet their infant's needs through interactions that focus on learning the infant's cues and solicitations for communication with caregivers. This education should also focus on encouraging the parents to be main contributors and team members during the infant's hospitalization as well as the primary caregivers for the infant beyond hospitalization in the NICU.

Theme five emphasizes consistency of care for the infant and parents. Parents develop rapport with the staff that are present for the majority of the hospital stay. This rapport assists in a team-like viewpoint of the healthcare staff, parents, and the infant where the main goal of all is to sufficiently care for the infant. Theme six, interaction with the infant, focuses on the idea that the nuances and sensitivity of parenting is lost while in the NICU environment. When parents are only instructed on when to care for their infant rather than how to recognize and respond to their infant's needs, attachment is hindered and, sometimes, destroyed. Theme seven focuses on the desire of parents to be heard. Parents indicate that information was given when requested, but the information did not always appear relevant to their questions or the staff appeared unorganized due to shift changes and the vast needs of the infant being monitored (Rinehimer, 2017).

The levels of intervention identified in the Pediatric Psychosocial Preventative Health model can inform music therapy attachment interventions for the NICU infant and parent, while the seven themes provide structure for effective intervention development (Kazak, 2006;

Rinehimer, 2017). The level of service in music therapy will change based on the hierarchy of needs for both the infant and parent, the parental stage of behavior change, and the infant gestational age and subsystem developmental competence. Accounting for all these factors and the unique needs of parents and infants in the NICU, music therapists can provide services to foster parent-infant attachment across the NICU hospitalization experience. In addition, music interventions should clearly support the desires of the parent with consideration for clear role identification for the parent and therapist in the intervention, provide face-to-face education and clear communication, strengthen rapport for consistency of care, support the parent's recognition and responsiveness in the intervention, and recognize and respect the parent voice (Rinehimer, 2017). Modifications should be made for the parent mental health and attachment history. These constructs can be integrated into a theoretical framework to foster parent-infant attachment during NICU hospitalization through music therapy.

Moderated Causal Relationships as Descriptors of Change.

A moderated causal model is outlined to demonstrate the relationships between previously defined the constructs for greater understanding of the needs of parents and infants when designing music interventions to promote secure attachment between the parent-infant dyad in the NICU.

Moderator. Moderators introduce a third variable into the model that impacts the effects of the determinant variable on the outcome variable (Jaccard & Jacoby, 2010; MacKinnon, 2011). The purpose of moderators is to give a reason for the relationship between the two variables by providing a third variable that accounts for the effect (MacKinnon, 2011). The moderator in this theoretical framework is the level of the hierarchies of need that both the parent and infant are identified at based on the music therapist's assessment at the time of referral to

music therapy. The identification of these components helps to establish the level of need for the parents and infant based on the modified parent and infant psychosocial preventative health model.

Mediated Moderator. Variables that are consider mediated moderators indirectly affect the relationship between variable and, therefore, the success of the intervention (Jaccard & Jacoby, 2010; Preacher, Rucker, & Hayes, 2007). The mediated moderator of this model is the fluctuation of the infant's health throughout the NICU hospitalization. Due to the infant's medical fragility, parents are deprived of the experience of caring for their infant in the immediate hours and days following the birth (Bernstein, Spino, Lalama, Finch, Wasserman, & McCormick, 2013; Burnham, Feeley, & Sherrard, 2013; Garfield, Lee, & Kim, 2014). The infants are also at risk for setbacks during their hospitalization that can impact development and their availability for interactions, which can negatively impact the ability of the parents to provide care for their infant. The lack of interaction between the parent and infant due to poor infant health negatively impacts the attachment relationship and can further complicate the implementation of the intervention if not accounted for by the music therapist throughout the treatment.

Mediator. Music is shown to provide a structure that mimics interaction and promotes an understanding of social and emotional components involved in communication (Abad & Edwards, 2004; de l'Etoile, 2006a; Delavenne, Gratier, & Devouche, 2013; Edwards, 2011; Standley & Walworth, 2010; Thompson, 2012). Music targeting secure attachment between parents and infants in the NICU is the mediator in this theoretical framework. Mediators explain why the determinant variable has a direct effect on the outcome variable (Jaccard & Jacoby, 2010). Due to its ability to teach reciprocal communication through its elements, music is an

ideal medium to build an intervention with the purpose of promoting parent-infant attachment. The music characteristics could integrate education and teaching on appropriate interaction behaviors that indicate to the infant that its needs are being met, while also providing opportunities for the music therapist to educate the parents on how to read and interpret infant cues for interaction.

Moderated Mediator. Moderated mediation is an indirect effect due to a moderator on the mediator that is partial or complete, strengthening or weakening the effect of the mediator on the outcome variable (Jaccard & Jacoby, 2010; Preacher, Rucker, & Hayes, 2007). The moderated mediator of this theoretical framework is the parents' position on the hierarchy of need and behavior change, the infant's position on the hierarchy of need and synactive development and how these independent positions are combined to best inform the course of intervention. When these two positions, which are affected by each other, are considered together, they provide a comprehensive picture of the needs of the family unit and how to promote the attachment relationship during the NICU hospitalization.

Outcome variable. The effect within the relationship, or the outcome of the relationship between the two initial variables is the outcome variable (Jaccard & Jacoby, 2010). The outcome variable in this theoretical framework is the sequential movement of the parents to the termination stage of behavioral change. This is achieved by identifying the appropriate level of intervention and the movement of the parents and infant through the hierarchies of need to self-actualization. Termination stage indicates that the parents are autonomous in caring for their infant, demonstrating appropriate techniques in responding to the infant's needs. The parents of an infant with a secure attachment demonstrate insightfulness into their child's needs by

accurately reading their behaviors, while maintaining an overall sense of joy towards the relationship (Martinez-Torteya, Rosenblum, & Marcus, 2017).

Determinant variable. The cause of the change within the relationship between the two initial variables is the determinant variable (Jaccard & Jacoby, 2010). In this theoretical framework, the determinant variable is the intervention that is prescribed based on the parent and infant psychosocial preventative health model's determination of level of need for the parents and infant. This theoretical framework functions to inform intervention development, therefore the determinant variable is not yet explicitly defined.

Intervention. Currently, this theoretical framework does not include an exact intervention. Literature suggests that music is an effective means of communication between parents and infants and can provide opportunities for secure attachments to be formed (Shoemark, 2013; Shoemark & Dearn, 2008; Shoemark, Hanson-Abromeit, & Stewart, 2015; Standley, Walworth, Engel, & Hillmer, 2011). Future research will focus on specific music intervention that can promote secure attachment between parents and infants by providing optimal opportunities for engagement between the parent-infant dyad. Table 1 identifies characteristics for consideration in the future development of music intervention based on the constructs defined in this theoretical framework. The physiological need is listed in the table first because it is the most important need to address in the hierarchy. The needs are ordered from top to bottom based on what needs to be achieved prior to moving onto the next level of the hierarchy.

Table 1: Attachment Music Therapy Considerations

Formal Theory Constructs			**Music Therapy Considerations**
Maslow's Hierarchy of Needs	Transtheoretical Model of Change: Stages	Transtheoretical Model of Change: Processes	
Physiological Need			-Parent coaching for subtle stress responsiveness
	Precontemplation		
		Consciousness Raising	
Safety Need			-Face-to-face interaction and interplay
	Contemplation		
		Dramatic Relief	
		Environmental Reevaluation	
		Self-Reevaluation	
Belonginess and Love Need			-Modified interaction based on medical stability
	Preparation		
		Self-liberation	
		Social liberation	
Esteem Need			-Gradual increase of parent autonomy in interactions
	Action		
	Maintenance		
		Stimulus Control	
		Counterconditioning	
Self-Actualization Need			-Promote individualized parent-directed interaction and parent articulation of infant's needs paired with own needs
	Termination		
		Contingency Management	

The Theoretical Framework for Promoting Attachment through a Music Intervention

The theoretical framework for a music intervention promoting attachment between parents and infants in the NICU is illustrated in Figure 4. Shading of colors progressing from dark to light represent the severity of need for the intervention promoting attachment based on the level of the Hierarchy of Need that the parent and/or infant is at and the level of intervention proposed by a modified version of the Pediatric Psychosocial Preventative Health Model that combines the infant and parent abilities to cope with distress coupled with common themes that emerge for parents during NICU hospitalization (Kazak, 2006; Maslow, 1943, 1954; Rinehimer, 2017).

The music intervention is placed in the middle of the model encompassing attachment promotion within the levels of intervention defined by the Pediatric Psychosocial Preventative Health model (Kazak, 2006) and the hierarchies of need for the parent and infant. Since the music intervention delivery model has not yet been developed the line is dashed to indicate an area still in need of further exploration. On either side of the components, a line occurs that takes into account the attachment relationship throughout the course of NICU hospitalization and how, moving up the hierarchies of need and the parent and infant psychosocial preventative health model, the relationship hypothetically improves with implementation of the music intervention.

The theoretical framework demonstrates constructs that should be considered when promoting a secure attachment between parents and infants in the NICU through music therapy. It is theorized that music intervention will impact the attachment relationship through improved developmental outcomes for the infant due to improved autonomy for parents in their caregiving skills. The theoretical framework combines developmental and music therapy perspectives discussed in the review of literature, as well as the formal theories of Transtheoretical Model of

Behavior Change (Prochaska & Velicer, 1997), Hierarchy of Need (Maslow, 1943, 1954), Synactive Theory of Development (Als, 1982), and the Pediatric Psychosocial Preventative (Kazak, 2006). These theories paired with a moderated causal modeling design integrate constructs necessary to consider when developing music interventions to promote parent-infant attachment across hospitalization in the NICU.

A Theoretical Framework to Foster Parent-Infant Attachment During NICU Hospitalization through Music Therapy

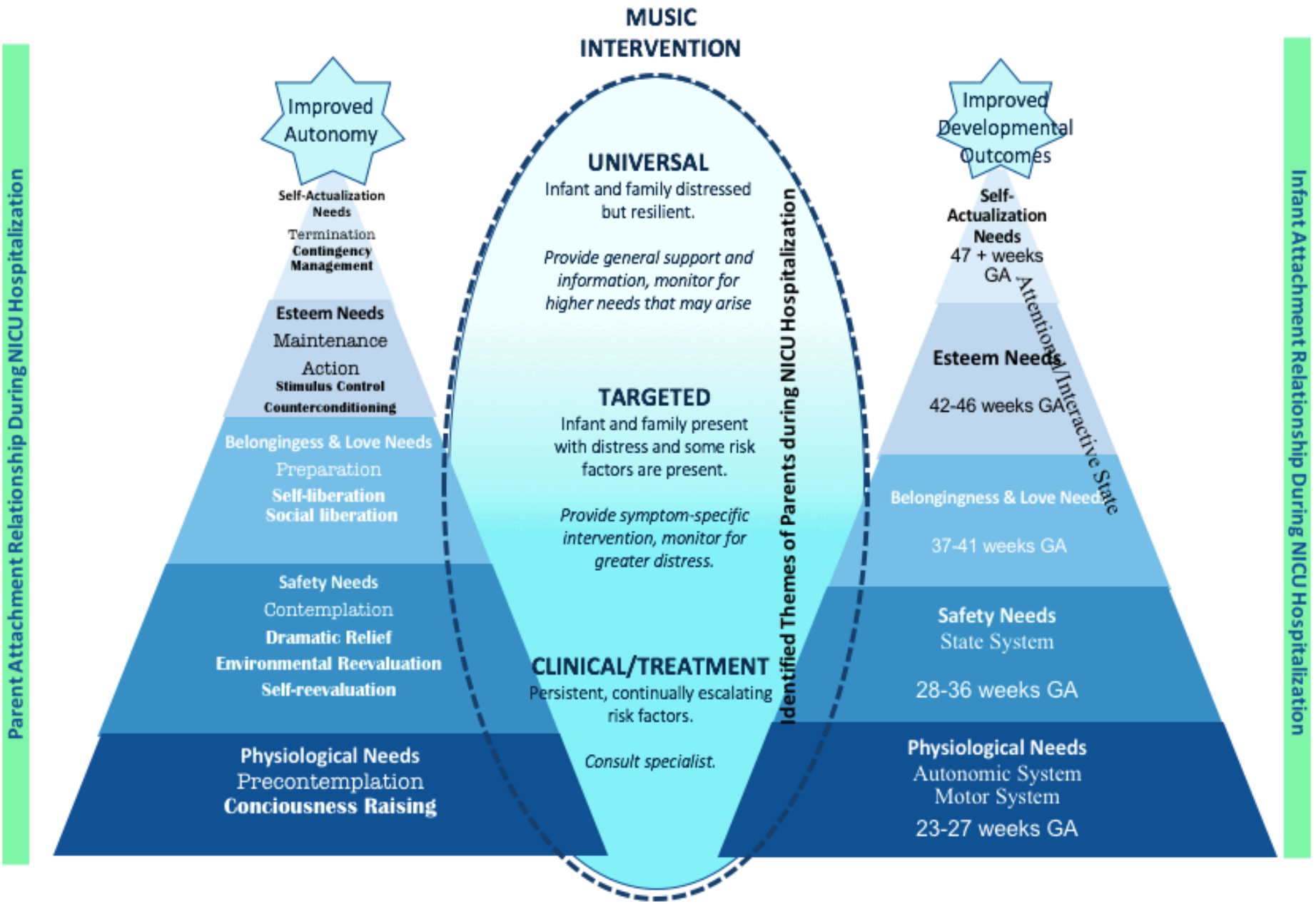

Figure 3: Theoretical Framework for a music intervention fostering attachment between parents and infants in the NICU

Chapter 5

Discussion

The purpose of this study was to understand the process of attachment and how NICU hospitalization impacts the development of the parent-infant attachment relationship in order to create an evidence-based theoretical framework for a music intervention to promote attachment between parents and infants in the NICU. This moderated causal model was developed from defined constructs from the Transtheoretical Model of Behavior Change (Prochaska & Velicer, 1997), Hierarchy of Need (Maslow, 1943, 1954), Synactive Theory of Development (Als, 1982), and the Pediatric Psychosocial Preventative (Kazak, 2006), combined with the extant literature on attachment relationships, infant developmental stages to inform parents understanding of infant care, parents expressed desires for optimal interaction, and the use of music to promote attachment (Abad & Edwards, 2004; Chen, Zhang, & Bai, 2016; de l'Etoile, 2006a, 2006b; Dellenmark-Blom & Wigert, 2014; Duft, Stafford, & Zeanah, 2017; Haslbeck, 2013; Rinehimer, 2017; Standley 2002).

A hierarchy of need and behavior change figure determines the parents' level of autonomy when consulted for music therapy services (Maslow, 1943, 1954; Prochaska & Velicer, 1997). A hierarchy of need and synactive development figure showcases the infant's developmental needs within the context of reaching self-actualization (Als, 1982; Maslow, 1943, 1954). In order to combine these needs and determine the best course of intervention for the parent-infant dyad, a modified parent and infant psychosocial preventative health model is placed in the middle of the parent and infant constructs to interpret the needs and allow the music therapist to provide appropriate treatment and education to the family. Themes informing the

parents' NICU hospitalization experience are also accounted for to best inform characteristics of intervention service (Rinehimer, 2017). The NICU hospitalization is included in the theoretical framework to account for its impact on both the parent's sense of autonomy in caregiving and the infant's developmental trajectory (Garfield, Lee, & Kim 2014; Smith, Dukhovny, Zupancic, Gates, & Pursley, 2012).

Theoretical Framework's Strengths

In recent years, music interventions utilized in health care settings shifted to include treatment models that address attachment, trauma, and neurological aspects of the NICU setting (Shoemark, Hanson-Abromeit, & Stewart, 2015). Although there is literature to suggest attachment is an important aspect of development, few studies provide detail as to how music can be utilized to promote attachment and strengthen the parent-infant relationship by providing increased opportunities for interaction. This framework provides a comprehensive overview of both the parents' and infant's needs during NICU hospitalization.

The theoretical framework provides a developmental perspective for the infant. This is crucial to consider when delivering services to preterm infants because of their uniquely complex medical and developmental nature (Als, 1982; Als & McAnulty, 2011; Hanson-Abromeit, 2003; Shoemark, 2013; Standley & Swedberg, 2011; Standley & Walworth, 2010; Symington & Pinelli, 2006). The Synactive Theory of Development (Als, 1982) and Hierarchy of Needs (Maslow, 1943, 1954) allow for a comprehensive picture of the infant's different developmental domains and how the intervention can best address their needs based on gestational age.

A strength of this model is the outlined behavioral change perspective for the parents. The NICU setting is a uniquely stressful journey and does not allow a typical parenting experience (Askelsdottir, Lam-de Jonge, Edman, & Wilklund, 2013; Burnham, Feeley, &

Sherrard, 2013; Hutchinson, Spillet, & Cronin, 2012). This model provides an extensive look into the different aspects of NICU hospitalization that affect parents and their perception of caregiving abilities. These perceptions, through the proposed music intervention, can be positively altered resulting in increased autonomy for parents and a secure attachment between parents and infants.

The emphasis on parent-infant centered care is another strength of this model. Early development of secure attachments is a foundational building block for appropriate developmental outcomes in infants (Duft, Staffor, & Zeanah, 2017; Edwards, 2011; Martinez-Torteya, Rosenblum, & Marcus, 2017; Shoemark, Hanson-Abromeit, & Stewart, 2015). Due to the nature of NICU hospitalization, barriers to secure attachments between parents and infants must be accounted for. Interventions can then promote these secure attachments in order to improve developmental outcomes (Caine, 2016; de l'Etoile, 2006a, Haslbeck, 2012; Haslbeck, 2013; Kurt, Spichiger, Stutz, Biedermann, Hosli, & Kennedy, 2010; Shoemark & Dearn, 2008). Incorporating a developmental perspective and emphasizing the need for secure attachments strengthens the findings in current literature. Implications for future practice as well as development of a music intervention to foster secure attachments between parents and an infant in the NICU are also noted.

Limitations

A limitation of this theoretical framework is the absence of a explicitly described music intervention. Due to the complex nature of music as a multi-sensory stimulus, a more complete understanding is needed to determine how music can specifically be used to promote interactions that lead to secure attachments between parents and infants. Techniques found in the literature that promote interactions between parents and infants include contingent singing (Shoemark,

2013), Infant-directed (ID) singing (de l'Etoile, 2006a; de l'Etoile, 2006b; de l'Eotile, 2015), and MMS (multi-modal stimulation) (Standley & Swedberg, 2011). Despite the techniques described that promote interactions, there is a lack of evidence that specific interventions promote attachment between parents and infants through musical interactions. This framework seeks to understand the constructs of the NICU environment and its impact on parents and infants. Music, as the primary intervention modality, will be explored in the future.

Another limitation to the study is the lack of information on attachment between parents and infants after discharge from the NICU. Follow-up programs are common after a NICU hospitalization and provide a valuable continuation of services; however, attendance can be a challenge for families making the care sporadic (Hwang et al., 2013; Kelly, 2006; Smith, Dukhovny, Zupancic, Gates, & Pursley, 2012). The treatment team strives to provide follow-up care that is directly related to the parents' and infant's needs and offer a support system for the family (Walker, Watters, Nadon, Graham, & Niday, 1999). There is a deficit in the music therapy literature that discusses follow-up procedures for previously hospitalized NICU infants who received music therapy services. More information is needed on post-discharge care and how the treatment team addresses attachment between the parents and infant in the home environment.

Attachment is impacted by many complex factors and is highly individualistic. It is possible there are other factors affecting attachment not present in this current framework. As an emerging framework, tests have not yet been completed to determine the impact the identified factors have on each other, nor the strength of the relationships between constructs of this theoretical framework. A comprehensive understanding of the factors involved in attachment and NICU hospitalization, as well as how the factors influence each other, is essential to develop a

comprehensive music intervention that fosters attachment between parents and infants. The detailed explanation of relationships between factors in the theoretical framework will better inform the causal model, allowing an additional figure including the causal model to be created.

Future Directions of Research

This theoretical framework provides an opportunity for future development of music interventions to promote secure attachment through increased interactions between parents and infants in the NICU. Intervention development is a process that involves multiples phases of research, with theoretical framework design being one of the first steps (Gitlin, 2013; Jaccard & Jacoby, 2010; Kleinman & Mold, 2009). With this in mind, the proposed theoretical framework gives an overview of the need for a music intervention to promote secure attachments between parents and infants in the NICU.

Currently, little research exists in literature that suggests other members of interdisciplinary teams, such as social work, psychology, and other allied health professions, are addressing attachment. Music provides a unique modality for interaction that mimics language and communication. Nuances in prosody, speech patterns, nonverbal signals and cues are also found in music and create an opportunity for parents and their infant to communicate without requiring verbalizations from both parties (Burnham, Feeley, & Sherrard, 2013; Haslbeck, 2013; Shoemark, 2013; Shoemark et al, 2018; Standley, Walworth, Engel, & Hillmer, 2011; Thompson, 2012).

More research is needed on the specific music components that can effectively support secure attachments between parents and infants. The current music therapy literature provides information on different techniques utilized in the NICU with parents and infants, but further understanding into how music can promote secure attachments through interactions with the

infant is warranted. How music impacts attachment formation between parents and infants is another aspect of the intervention design that should be further explored, as well as the relationships between all of the factors present in the illustrated model. This will provide a more complete understanding of the need and how elements of music can best meet this need.

This theoretical framework makes clear the value of a sensitive assessment that can identify the specific need of the parent in the context of their infant and the NICU experience across hospitalization. Sensitive assessment will inform the design of targeted intervention and new music-based experiences may be necessary. Designing the music intervention will also require a more comprehensive understanding of how music impacts attachment and can be utilized in the NICU setting. When designing the intervention, creating levels of intervention should be considered to provide a clear rationale for need based on sensitive assessment. Levels of intervention can be based in the Pediatric Psychosocial Preventative Health Model, which provides three levels of support from the treatment team (Kazak, 2006). These levels, music therapy assessment, and this theoretical framework could guide targeted music intervention development.

The final direction for future research is to engage in a feasibility study to ensure this theoretical framework for a music intervention promoting attachment is something deemed helpful by both parents/caregivers and other healthcare professionals. A mixed-methods feasibility study is an option that would provide parents with the opportunity to rate their experience in the NICU, their current stress levels, their perceived needs, and whether a music intervention promoting attachment is of interest. Such a study could also include healthcare professional perceptions to provide a more complete picture of the treatment team's interest levels in the intervention.

Implications for Practice.

Music interventions should account for attachment and opportunities for increased interaction between parents and infants in the NICU. Music therapists should seek to understand the family unit's unique experience of the NICU, as well as how to provide intervention based on the individual experiences of the parents and infant. Music therapy provides a unique modality, music, as a mechanism of change within a triadic relationship between the parents, infant, and music therapist. This relationship can foster a space that is safe and allows for creativity, providing a normalized experience where parents and the infant are encouraged to engage in typical interactions with one another (Hanson-Abromeit, 2003; Haslbeck, 2012; Shoemark & Dearn, 2008; Shoemark, 2013).

Music therapists should also be aware of how to effectively incorporate the parents' needs and the infant's developmental level into the intervention. This theoretical framework provides potential points of intervention for the music therapist to engage the parents in, for the purpose of maintaining rapport in the therapeutic relationship while also ensuring that the parents' psychosocial needs are met. The infant's developmental level and needs are also emphasized throughout the framework and model to ensure appropriate steps are taken to improve developmental outcomes for the infant. This improvement can occur based on parents' successful interactions with the infant and improved autonomy of the parents from the music therapist's support and education.

Conclusion

A deficit in music therapy literature exists in combining developmentally sensitive care and parent-infant interactions to support a secure attachment between parents and infants in the NICU. The NICU hospitalization of a preterm infant is a major life event that impacts both the

infant and parents in all domains. Pervasive developmental delays can occur during and after the hospitalization due to the infant's inability to have their needs met by their primary caregiver (Duft, Stafford, & Zeanah, 2017; Shoemark, 2013; Standley & Walworth, 2010; Zeanah & Smyke, 2009). Parents can account for the multiple risk factors associated with NICU hospitalization and provide developmentally supportive, attachment-promoting care to their infants, which improves both parent autonomy and the infant's developmental outcomes.

The purpose of this study was to create an evidence-based theoretical framework for a music intervention to promote attachment between parents and an infant in the NICU. This understanding prompted the creation of a theoretical framework for a music intervention that promotes attachment between parents and infants in the NICU. Causal modeling was used to integrate and connect the constructs identified in the literature review, including formal theories such as the Transtheoretical Model of Behavior Change (Prochaska & Velicer, 1997), Hierarchy of Need (Maslow, 1943, 1954), Synactive Theory of Development (Als, 1982), and the Pediatric Psychosocial Preventative (Kazak, 2006). This theoretical framework promotes attachment between parents and infants in the NICU and forms the foundation for developing a music intervention targeted at specific needs of parents and their infant.

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